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OBSERVATIONS OF A RURAL HEALTH WORKER

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IT IS a great honor your university has bestowed upon me, in appointing me Cutter Lecturer for the current academic year. I wish to express to you my profound appreciation for the compliment you pay me in asking me to address you.

The title I have selected for my lecture is "Observations of a Rural Health Worker." There are several reasons for my choice, personal as well as general. During the past years I was connected with rural health work, either as a director of health in a rural country, or as a fieldworker in rural districts. The first country in which I was employed was Yugoslavia, and the second, the largest rural country in the world, China. Being connected also with the international health service conducted by the League of Nations, I visited a large number of countries, undertaking a series of studies, in particular on the problems of rural health.

While I was trying to carry out some of my assignments I was confronted with the problems of rural life, and I found that successful results in rural health work depend on a number of factors usually considered to be outside a physician's province.

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In recent years, in every country there has been a growing consciousness of the significance and importance of rural health. Each country has its own traditions, its own changing economic and social situations, which leave their mark on the development of public health, and it is therefore impossible to recommend one system for all. There is, I think, one point on which all are agreed, namely, that arrangements for the care of the health of the great masses of peasants in nearly every country are still far from adequate, and that this question has given rise to the important problem of public health, which has become increasingly more urgent with the existing rural distress. The practical application of our knowledge in public health is difficult in rural districts. In countries where the population is mostly agricultural, we may find excellent health activities in the urban districts, but there is usually a lack of physicians and health services in rural districts. It is commonly known that the death rate is higher in rural than in urban and industrial districts, and that the occurrence of infectious diseases is also higher. Some decades ago rural districts were healthier in comparison with urban. Now, the discoveries and experiences in public health are better applied and carried out in urban and industrial areas.

The vitally important need for health workers in rural areas is universally recognized. There are still enormous rural areas in the world without any proper medical aid, and without any preventive work. Even in the countries which have produced certain important results in public-health work there are still rural districts entirely neglected from the standpoint of health. The distribution of physicians is not made according to the needs of the total population; only a small percentage of them live in rural districts. The same can be said about auxiliary personnel. An illuminating study conducted by Dr. Kacprzak in Poland, in regard to the distribution of the physicians in 105 districts out of a total 241, shows that in the urban areas there was one physician for 1394 inhabitants and in the rural areas one for 21,414. In the villages only about 40 per cent of the deaths were certified by a physician, and only 30 per cent of the confinements were attended by a trained midwife. Similar facts have been pointed out by Dr. Stoichia in Roumania, where in rural districts only 35 per cent of the deliveries were attended by a qualified midwife. While in the urban areas 65 per cent of the confinements take place in hospitals or maternity homes, in rural districts this percentage amounts to only 1.2. In 1935, in the villages, only 22.4 per cent of the

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registered deaths were attended by a physician during the illness; in the urban districts this percentage was as high as 32. In the rural areas 89 out of 100 infant deaths were not seen by a physician, in the urban districts 48. Out of 8273 physicians registered at the Roumanian Chamber of Physicians, 7010 resided permanently in the cities, and 1263 in the villages. There was one physician for 508 inhabitants in urban districts and one for 12,297 in rural districts. In Bulgaria at the end of 1936 there were 2719 physicians. Of this number 579 lived in the villages and 2140 in the cities. Not more than 20 deliveries out of 100 were assisted by a trained midwife. In Yugoslavia the situation is very similar. Of a little over 5500 physicians, only 800 are working in rural areas. In Austria more than half the physicians reside in Vienna — one for every 373 inhabitants; but in the province of Burgenland, which has the most rural territory of all the Austrian provinces, there is one physician for 2325 persons. The number of Hungarian physicians amounts to 10,306, of whom 4543 reside in Budapest. The ratio for Budapest is one physician for 219 inhabitants, and in the villages one for 1730. There are at the present time not more than 3200 medical men in Turkey, with a population of over 16,000,000, and these are located mostly in the larger cities — 1000 in Istanbul alone. In Greece there are about 6500 physicians, of whom 1800 reside in Athens-Piraeus, with a population of slightly over 800,000. Czechoslovakian industrial areas are provided with better health services than are the typical rural districts. In the Soviet Union the five-year plans have provided an increasing number of physicians and health institutions in the villages, but their number is insufficient. The status of the health services in the large and predominantly rural countries of the Far East is surprisingly inadequate. In China there are less than 10,000 physicians for more than 400,000,000 inhabitants.

Generally speaking, social security for the farming population does not exist. For the workers engaged in industry proper a series of social insurance schemes have been enacted; for the workers engaged in agricultural labor this has been done only on a limited scale. The population of the urban and industrial districts is not only benefiting from the services organized for the treatment of the sick and for the prevention of disease by social security schemes, but is also taking a larger share in the social and health services organized and maintained by public funds.

It is difficult to estimate the rural population of the world, because changes are occurring in the composition of the population in general. There has been a large rural exodus in almost every country. The growth and rapid development of urban districts have been striking. In general the percentage of the rural population has decreased. Still, of the 2 billion people in the world, at least 1½ billion are living in rural districts, mainly engaged in agriculture and home industries.

This agricultural population has a long history. The tillers of the soil made their own history, which influenced the events of the world. Their social position underwent three most important influences: that of outright slavery, that of serfdom, and, beginning several decades ago, that of personal freedom. In the vast area in which the rural population lives there still exist conditions which make life hard and even insupportable.

For centuries, farmers have been fighting for the possession of their own land. This struggle is still under way. The Roman Empire was weakened by agrarian revolts. The uprisings of the farmers which have occurred in almost every century were the consequences of social and economic unrest. In the period from 1789 to 1870, the agrarian revolution in European countries gave peasants freedom but left them still economically dependent. In the period after the Franco-Prussian war, in most European countries land reforms were carried out. The large holdings were expropriated and divided among landless peasants and those owning small land holdings. New settlements were established for the former on the large holdings previously belonging to wealthy landlords. In the Far East, with the largest rural population in the world, amounting to nearly 1 billion, the social and economic status of the peasantry has not changed materially, being still semifeudal in character. In China, rural distress caused agrarian revolts over a large part of its enormous area and resulted in the loss of millions of lives. In India, the second largest rural country, there still prevail conditions which are keeping farmers in extreme poverty. In Japan there occurred an impressive improvement in the cities and a large number of industrial establishments were built up, but the farming population has remained to work the land, which for the most part does not belong to them.

In Europe, after the great reforms in the nineteenth century land could be conveyed with freedom, and family ties were weakened. This has produced a phenomenon known as the pulverization of holdings. The process can be shown by a few examples. In Hungary small holdings, those under five acres, numbered little over 22,000 in 1851. The total rose to over 1,000,000 fifty years later. In the same period the number of agricultural workers doubled. A survey made in some

parts of Yugoslavia shows that the percentage of small holdings increased by ten from 1850 to 1936. In the period before the land reform was carried out this increase was even larger. With the growth of the rural population the number of the land-hungry peasants increased from year to year. The only means of relief was to reclaim the land and to enlarge the area for cultivation. As this work had generally not been undertaken on a large scale, there began a rural exodus and emigration to overseas countries and to newly industrialized regions. As emigration became more and more difficult during the last two decades, and more recently became practically impossible, distress in a large number of rural countries has even deepened.

In the past century urbanization and industrialization have gradually taken place in western European countries. The German urban population in 1871 was 14,800,000 and the rural population 26,300,000. In 1910 the urban population amounted to 39,000,000 and the rural to 25,900,000. In England in 1851 half the population lived in the cities and half in rural districts. Eighty years later, only 20 per cent of the population inhabited rural areas. In Belgium the number of the persons actively engaged in agriculture has decreased considerably in recent decades — from 25 per cent of the total population in 1846 to 8.2 per cent in 1930. In France from 1921 to 1931 the rural population decreased by 15 per cent. An urban and industrial Europe has come into existence.

The following facts give a picture of the agrarian situation in countries in which a large part of the population is engaged in agriculture.

In Poland there are 3,300,000 farms, the size of which varies widely. According to the census of 1921, two thirds of these farms were under ten acres and occupied only 25 per cent of the total arable land, while 19,000 farms were over 200 acres and occupied 27 per cent of the arable land.

In Yugoslavia, of 15,000,000 inhabitants 11,500,000 make their living from agriculture. Ninety-five per cent of all peasant families possess less than half and 5 per cent a little over half of the area under cultivation. Almost 20 per cent of the rural population possess no land at all, their income being derived from agricultural labor. Bulgaria is also a land of small farms. About 65 per cent of the land holdings are from five to twelve acres, occupying altogether six tenths of the arable land.

In Hungary, according to the 1930 census, 1644 land proprietors had holdings larger than a thousand acres; 10.1 per cent of all proprietors owned 14.8 per cent of the land and 779,105 proprietors held not more than two and a half acres, while 59.9 per cent of all proprietors owned only 4.3 per cent of the total arable land. The number of laborers who were entirely landless amounted to a quarter of the total population. One third of them possessed their own cottages with small gardens. They earned low wages, which were in general below those earned before the World War. According to recent data, 55 per cent of the agricultural laborers were unemployed in the winter months of 1932-33; the average length of employment was 130 days, or barely 45 per cent of the potential annual working time. About 500,000 of these workers were not even employed during the summer.

In Roumania, 2,500,000 of the 3,300,000 farms comprise holdings below ten acres.

In Italy, one quarter of all the farms contain about one acre; 2,760,000 farms below eight acres occupy eight million acres, and 1596 large holdings comprise an area of ten million acres of arable land.

In Spain, the landed aristocracy, representing only 1 per cent of the total population, possesses more than half the total area of cultivable land. Three years ago, 3,000,000 of the 5,000,000 families engaged in agriculture possessed so little and so poor land that their standard of life was no better than that of the agricultural laborers. The large estates were worked by these landless laborers, whose earnings were very low.

In Far Eastern countries also, the rural situation is disquieting. The rural distress in India is shown by the rapid increase of domestic servants recruited from the agricultural population — from 2,500,000 to 11,000,000 between 1921 and 1931. In the Punjab over 55 per cent of the cultivators till less than five acres. This amount is not higher in other parts of India. The Punjab is called the land of peasant proprietors, but about 60 per cent of the land is cultivated by tenants paying cash or crop rents. In the United Provinces and in Bengal this proportion is even higher. It is estimated that in the United Provinces about 56 per cent of all tenants and peasant proprietors possess undersized holdings. In the central plains of Siam 36 per cent of the farmers possess no land, in the north 27 per cent, in the south 14 per cent and in the northeast 15 per cent. In the most fertile irrigation districts nearly all the families are tenants. In China, big land proprietors, absentee landlords and officials, forming only 10 per cent of the population, possess more than half the land under cultivation, and poor peasants, tenants and agricultural laborers forming 65 per cent of the population possess only 15 per cent. A survey undertaken in some of the eastern and southern provinces showed an average holding of less than one to one and a half acres. In one of the

most fertile provinces in the south, two thirds of the farmers were living on one third of the land. In the most densely populated area of China, south of the Yellow River, tenancy is the most common form of land tenure. On the average, the tenant farmer pays about one half the proceeds from his crop to the land proprietors. In rural Japan feudal conditions still prevail. Sixteen per cent of the cultivable land is in the hands of the big landlords. With very few exceptions they rent their land to the poor and landless farmers. Half the total number of land holdings are composed of farms averaging less than two and a half acres in extent and comprise a little over 8 per cent of the total area under cultivation. The same area is owned by the big landlords, who possess over 120 acres each, but the number of their holdings amounts to only 0.1 per cent of the total. Of every 100 farmers, 74 are tenants or part-tenants and small owners.

The history and influence of the large landed properties or haciendas on rural life in Central and South American countries is too well known to be described here. The distress of the peasantry and agricultural workers caused by them is common knowledge, as are the resulting disturbances, which affected the whole rural life of some states. Of this, Mexico is an example. There are very large holdings amounting sometimes to two hundred and fifty thousand acres. The land is cultivated by the workers, who are bound to haciendas. This system has left some 5,000,000 of the population without agricultural holdings. They are laborers on the large farms, earning very low wages. In Chile the large estates of over two thousand acres, 1.8 per cent of the total number, cover nearly 80 per cent of the arable land. The living conditions of the agricultural workers are deplorable.

The rural areas are supplying cities and industrial districts with cheap labor and foodstuffs. The standard of life in the urban and industrial regions has improved very rapidly, while progress in the rural districts has been very slow. A large amount of agricultural products are exported from rural countries, and this is sometimes considered as a sign of prosperity in these regions. A survey undertaken in several rural countries on the nutritional status of the population showed that there exists undernourishment among a large number of the rural population, and that agricultural products are exported from rural countries without consideration of the nutritional requirements of the people. The reasons are purely commercial. The industrial products imported into the rural countries in exchange serve mainly the urban population and industrial establishments, from which the farming population derives comparatively very small benefit. To cover their money requirements the farmers owning small holdings are usually compelled to sell the best products of their farms to the town people. Thus they are helping the cities and industry, themselves remaining far in the rear in regard to sanitation, housing, health and general education.

The unfavorable social and economic conditions of a very large part of the rural population, which have been pointed out here only in a general way, were followed by other phenomena such as illiteracy, illness, a high general and infant death rate, poverty, unrest and migration; the time allowed for this lecture is too limited to permit describing them in every detail.

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When I was reviewing the rural conditions all over the world I thought about the rural health workers who are confronted with this situation. I am thinking now about medical officers who have initiated and are directing and stimulating health work in rural areas. The primary duty of a physician in a rural district was for a long time considered to be to serve as a helper to the sick. My own experiences have led me to believe that a health worker in a rural country must go much farther, and that his service must be connected with a scheme of general rural reform. His work when isolated is bound to fail. After working for some years in my native country and in China I came to the conclusion that successful health work is not possible in areas where the standard of living falls below the level of tolerable existence. The removal of social grievances, such as the sense of exploitation by others, is of the greatest importance. For social and health services depend for their success on the co-operation of the people, and this will only be given by a population which is reasonably optimistic concerning the future, and which is willing to give at least qualified acceptance of the social order.

After these general remarks I should like to make some observations in regard to the role of a physician in a rural country. I am thinking here mainly about the health officer, whose duty is to lead and to create. Obviously he is confronted with a much more difficult task than is a medical officer of an urban or industrial area. The rural conditions are still not sufficiently known, and for this reason the work of such a health officer is more difficult and cannot always be carried out on the usual pattern. In rural areas there is plenty of room for new starts and for very illuminating studies. The vast rural districts, which have never been properly covered by medical men, give a special opportunity for a wide field of health in-

vestigations and activities. There are still millions of human beings whose health has never been properly cared for. There are still very many physicians graduated from the best medical schools, with inadequate knowledge of the importance of rural health problems and rural conditions as well as the enormous possibilities for health work in rural areas.

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Medical activity was formerly concerned mainly with the treatment of the sick. The best doctors attended only individual patients, and the services they provided were limited to a relatively small proportion of the population. The unequal economic conditions among patients have naturally had a detrimental effect on the relations between the doctor and the patient. Owing to the ever-increasing number of doctors, the practice of medicine is thus placed on a totally different basis.

The social side of medicine should not be neglected. This applies particularly to rural areas, where social and economic conditions influence the whole rural life. This side of medicine is concerned with the problems of social ills and their origins and of social medicine. A rural health worker should bear in mind these aspects of medicine.

The social ills of rural areas are concerned with a large group of social problems of a medical kind, such as bad housing, social diseases and malnutrition, which cannot be properly understood until their connection with social conditions is realized. Such investigations cannot be conducted in laboratories alone, but involve probing into every smallest part of the people's life and the closest scrutiny of the habits and customs and of the particular sections of the community.

The practice of social protection and prevention are showing ever more clearly that the medical man must make use of social science and that an acquaintance with it is essential to the success of his work. This leads to a change of approach in medical work, in this sense, that the physician applies his learning to the people as a whole, thus extending his knowledge and becoming a physician of the whole community. With the experience thus gained and the skill developed by practice, the medical man learns to feel the pulse, not merely of the single patient but of the nation as a whole, to study pathologic phenomena, not only in the lecture rooms and laboratories of institutes and in hospitals but on the body of whole sections of society, and indeed of the nation as a whole.

Whereas doctors were usually regarded as representatives of a purely humanitarian work, their activities, viewed from this angle, have made them factors in economic life. Ruskin rightly defined the true aim of national economy as "the producing of as many as possible full-breathed, light-eyed and happy human creatures."

The importance of education on matters of public health should be specially emphasized.

The problems of public health do not fall exclusively within the province of the activities of a medical man, for health is our common heritage. The people's minds must be prepared for the measures to be applied, so that they can understand them and contribute to their enforcement. A law, however excellent, cannot be properly carried out, can yield only very poor results, if it finds no support among the people. This conception of education as a part of preparatory work for health activities shows most clearly how the physician should be a teacher of the people; indeed, he should make the greatest possible use of education as the best and surest way to success.

If we turn our attention to the problems of rural health, we can readily realize the importance of such a work in this field, for many of these problems can be solved by the methods mentioned above.

Medical activity is changing. Out of the physician who looked after and cured an individual there has developed the physician who looks after the health of a whole society. This development in the medical calling is a logical result of the growth of preventive medicine. It has led the physician out of the consulting room into society to contribute his full share to the health of the whole world.

It is usually assumed that the peasant is primitive and conservative, and that in his case health work encounters great difficulties. This conception, however, is due only to insufficient knowledge of the peasant's life. Our training usually takes us far from ordinary rural life, even in the case of persons of peasant origin. Peasant life nevertheless contains all the elements required for every form of progress. Generally speaking, people have not bothered much about the peasant, as he is always looked upon as a permanent source of new life and reinvigoration in every nation. Yet in the villages, among the peasants, spiritual life can be found in abundance by those who would seek it out.

Are not the famous national songs and costumes the best indication of an exceptional spiritual life? Have not many famous men sprung straight from the peasantry? Sensitive to many fine features of peasant life, writers of genius have described them in some of the great masterpieces of literature. My happiest memories are those of life among the peasants. During my last period of

activity my deepest impressions were those gained during the days I spent among the Chinese peasantry. The peasants in Yugoslavia have shown an extraordinary strength in their struggle for a better life. The Croatian peasants are organizing themselves socially and economically, preparing a basis for a better future. In their houses have been born writers who are active in every branch of public life. There is everywhere a strong movement among the peasants all over the world.

Thus a closer acquaintance with the peasant and a detailed study of conditions in rural districts are necessary before a plan of work can be mapped out. The peasant represents by far the largest component of the population in most countries; yet we know little and learn less about peasant life. Physicians often discuss the great incidence of mortality and disease among the peasantry, but these questions are not studied so thoroughly as they should be, particularly in the light of this consideration: that health questions in rural districts can hardly be undertaken without a knowledge of general peasant standards.

Applied hygiene has before it a wide field of research into cultural, social, economic and health conditions in the rural environment. Some investigations have already been made on these lines in some countries, but they are isolated and disconnected in character. Moreover, the school and the home, manners and customs, cannot be separated from health. The physician should make it his first business to familiarize himself with peasant life from every angle; otherwise he will scarcely be in a position to organize appropriate health protection. The field of work must be known before systematic labor can begin.

Education is one of the most difficult problems in rural districts, but without it no progress in health work can be achieved. This work is sometimes regarded as an easy matter, but it calls for great skill, and requires a thorough knowledge of the region and of the people's minds. Overelaborate popular health education, undertaken without suitable preparation or a correct knowledge of conditions of life in the country, can occasionally do more harm than good. The educational activity of the village physician is necessary, if only to secure the collaboration of the population in health matters. As has already been pointed out, the whole population must participate in general health activities, for only thus can health-consciousness and the desire for health become general. The need for general collaboration must be particularly stressed in these times of economic depression; the health machinery in country districts can be planned by experts in the light of the latest experience and knowledge, but the practical work must have the support of the population, and institutions for the protection of health must be set up by their help. Nothing is easier than to collaborate with peasants in the right way; they have great resources of common sense and understanding, courage and strength.

If the peasant in his struggle for existence has opened the wide spaces of the earth and drawn from them with his own hands the natural products on which the great cities live and flourish, why should he not sink wells, build water mains and erect health institutions? In the course of my long experience I have always found it easy to secure this co-operation, and I am more than ever convinced that the peasant is the best collaborator in health matters.

The most efficient method of health education in rural districts is the establishment of health activities, from which a peasant derives a direct benefit. Such a method is employed in Yugoslavia. The schools of public health and the institutes of hygiene are the centers of rural health activities. They advise farmers in sanitary engineering matters, conduct field work with their help, construct wells, latrines and manure pits and devise rehousing schemes on individual farms and establish central water supplies for whole villages. The schools and the institutes sometimes help with material for construction or with cheap loans, and the farmers contribute free labor. Such field work naturally stimulates an interest among the peasants. It creates a movement for better health among the rural population. In special classes during the winter the peasants are taught subjects of general educational value, but particularly those of agriculture, basic veterinary work, animal husbandry and health. The peasant women attend special courses in home economics, at which they are also instructed in health matters. Such methods show far better results than those of lecturing and exhibiting.

Nutrition in country districts has not been sufficiently investigated, so that here we are still largely on unexplored ground. Some people, thinking of the food the peasantry produce, wrongly assume that the peasant population has at all events enough to eat, but it is no exaggeration to affirm that in many districts the peasantry goes hungry, and that in even more districts the diet is unsuitable. Let the village physician devote a great deal of attention to this field of preventive medicine, for he can do much that is practical.

The value of the collaboration of the population in health matters has been sufficiently demonstrated. As has just been said, health work cannot be conducted actively in isolation, but must be accepted as part of the general work of rural reconstruction.

Purely medical activity cannot adequately promote the public health, since health problems depend for their solution on educational, economic and social factors which exert a decisive influence in most cases of disease. In country districts complete success by the physician is only to be expected if his activities are combined with those of the schoolteacher, the agricultural expert, the veterinary surgeon and the engineer.

The prevention and control of animal diseases is particularly important. The occurrence of infectious diseases among animals in rural areas is very high, and the losses are sometimes disastrous to rural economy, causing additional distress and poverty. The combined activity of a physician and veterinary surgeon in the village is very welcome to the farmers. They are most interested in health work if economic advantage follows it. In a remote part of China, in which animal husbandry plays an important role in rural life, the health services recently organized have been combined with services for the protection of animal health. The agricultural experts can introduce a better method of cultivation, and raise the yield per unit and thus also the standard of living. Engineers can reclaim, protect and increase the area of the arable land. Some data concerning Yugoslavia will clearly show to what extent such a work could improve the peasant life. In that country almost one quarter of the total population lives in regions which are too infertile to produce sufficient food. It is estimated that about one half this population must buy three quarters of the grain required for bread. The poverty in these regions sometimes prevents the people from buying necessary foodstuffs. Yet the area which is not under cultivation or not properly protected, and which could be made arable, is sufficiently large to provide the inhabitants with food, to raise the present low standard of living and to improve rural health conditions.

The chief professional help must come from the public-health nurse, but she can be of genuine assistance only if she works on the same principles. She must act as a helper and teacher to the peasant population. It should be emphasized that to do her work aright and to be successful, the nurse must have been trained in the right way. Specialist training in various branches of health work would, however, be uneconomic and unsuitable in rural districts.

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The tasks we have described naturally require a new outlook on the part of the medical profession; the spirit of the times and the even more manifest health needs of the peasant population compel us to think and work differently as time goes on.

There are several reasons for the maldistribution of physicians, medical aid and preventive work in the rural districts. Naturally the factors of economic nature are of primary importance. As long as a health worker cannot make an adequate living out of rural health work there will be a general lack of physicians in rural areas. Educational factors are also playing an important role. Villages are generally considered to be an unsuitable field for medical activities. Effective rural health work requires certain changes in medical education, particularly in regard to the social aspects of medicine. The other important factors should not be overlooked. The social and economic conditions of the rural population are in general such that they require a profound change. We reached the conclusion long ago that economics and health are interdependent, and this fact applies especially to rural areas. Successful health work can be attained only if it is correlated with other activities for the improvement of rural life. This naturally depends on a successful collaboration of the people and their free participation in public affairs. A rural health worker must therefore be a promoter of a social, political and economic peace. For these factors are fundamental requisites to the success of rural health work.

THE LOCALIZATION OF INTRACRANIAL LESIONS BY ELECTROENCEPHALOGRAPHY

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NEUROSURGEONS have been greatly handicapped in their operative approach to intracranial lesions such as tumors and abscesses by difficulty in localizing the lesions. The most skillful neurological examination succeeds in doing so only in a minority of cases, and every clinical neurologist has from time to time found it impossible to decide whether symptoms of high intracranial pressure are caused by a frontal tumor or by an obstructive lesion of the posterior fossa. Study of the chemistry and hydrodynamics of the cerebrospinal fluid may facilitate the interpretation of clinical observations, and auxiliary methods employing radiography — encephalography, ventriculography and arteriography — have played an increasingly important part in the diagnosis of these lesions. The routine use of such radical diagnostic procedures in these cases reflects the difficulty which the clinical neurologist encounters in establishing accurate diagnoses.

The limitations of the available methods of investigation of neurologic disorders, especially those involving the central nervous system, render any additional diagnostic procedure of particular value to the clinician. Should this method enable the neurosurgeon to plan his operation with greater certainty and safety, it would have great practical value and earn an established place in clinical investigation.

That such a procedure is available was shown by Grey Walter[4] in 1937, for he proved that electroencephalography affords a technic for the localization of intracranial lesions which has a high degree of accuracy without involving any discomfort or danger to the patient. He had observed[3] that a focus of abnormally slow electrical waves collected from the intact cranium coincided with an area of cortical involvement by gliomatous tissue. Later[4] he predicted the position of cortical damage in 12 cases in which tumor was subsequently seen. He showed that the slow waves occurred in poorly functioning cortex. In 26 cases with normal cortical potentials and in which a cerebral tumor had been suspected on clinical grounds, the subsequent investigation and progress of the cases showed that none had been present. It appeared, therefore, that the method had very great practical application.

Walter developed his technic as a modification of that described by Adrian and Matthews.[1] With pads moistened in salt solution and placed on the scalp, he led off and amplified the minute changes in electrical potential — of the order of 1/50,000 of a volt — which are produced by the brain. He recorded these with a cathode ray oscillograph on moving bromide paper. With three pairs of electrodes connected to three separate amplifying and recording units, he was able, by noting the amount of abnormal activity in the three records and the phase relation of the abnormal slow waves, to determine which electrode was immediately over the focus of discharge (Fig. 1). By moving the electrodes he determined the size and shape of the focus.

In order more fully to ascertain the value of this method to clinicians it seemed desirable that it should be tested independently on a random sample of patients under the conditions of ordinary hospital practice. This we have done, using the technic described by Walter, the only difference being that the oscillograph records were made with an ink-writing instead of with a cathode-ray oscillograph.

RESULTS

Most of the patients were referred from the Neurological and Neurosurgical Units of the Boston City Hospital. We are indebted to Dr. Donald Munro, Dr. Walter Wegner and Dr. Tracy Putnam for their co-operation in this investigation. A few patients in whom the diagnosis was obscure and to whom it was thought that electroencephalography might be of value were referred from other hospitals. So far as possible all the cases were examined in ignorance of the history or clinical findings, and clinical reports were not obtained until a report had been given on the electroencephalogram.

Eighty patients were examined, of whom 50 had abnormal cortical potentials with evidence of focal disturbance. Seventeen patients showed no cortical abnormality, and 13 had records characteristic of epilepsy, without any evidence of a constant focus of discharge of slow waves.

In 13 of the 50 cases with foci of abnormal

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discharge operation was not performed, and the clinical diagnosis was too indefinite to verify the accuracy of the observations. In these cases it was impossible to discover whether the focus corresponded with the position of the organic lesion.

In the remaining 37 cases verification of the position of the abnormality was possible. In 22 the lesion was seen at operation or autopsy, in 10 its position was established by unequivocal clinical findings, confirmed in 4 by radiological evidence, and in 5 a bone defect was present in the skull as a result of previous trauma. In every one of these 37 cases the position of the single focus of abnormal discharge corresponded closely with the site of the organic lesion. For purposes of verification the 22 cases in which the cerebral lesion was seen were of greatest value. In these the correlation was striking. It would not be profitable to describe all the cases in detail. Instead, brief summaries illustrating the results in a few of them are recorded below.

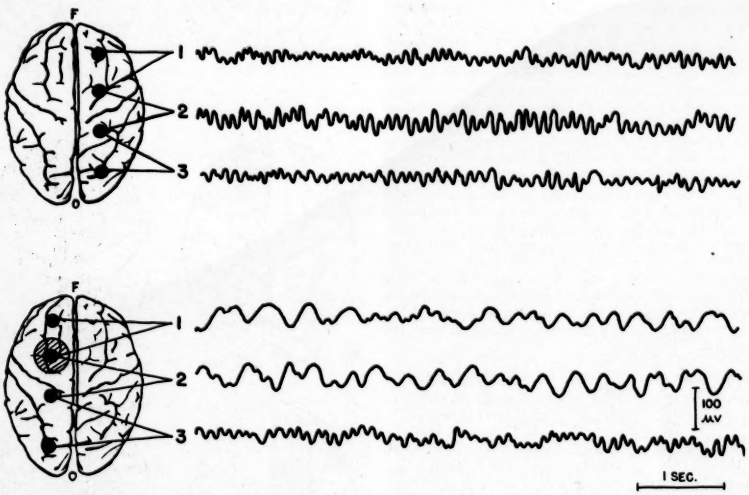

Figure 1. *Records taken from the scalp of a patient with a left midparietal lesion. Three units are recording from the head. In the upper three tracings, electrodes are placed in an anteroposterior position in the right hemisphere. A normal rhythm of about ten per second is seen. In the lower three tracings, similar leads are used in the left hemisphere. Large slow waves of one or two per second are present in leads 1 and 2. The normal ten-per-second rhythm is absent. The slow waves in lead 2 form a mirror image of those in lead 1, indicating that the focus of discharge is originating under the electrode which is common to leads 2 and 1.*

CASE REPORTS

Case 1. F. G., a female aged 55, was admitted to the Boston City Hospital in May, 1935, complaining of left-sided Jacksonian seizures. A diagnosis of right frontal cerebral tumor was made. She was discharged, having refused operation.

She was readmitted in December, 1937, with symptoms of high intracranial pressure, failing vision and generalized grand mal seizures. There was bilateral papilledema with a hemorrhage on the right. The pupils were irregular. There was slight weakness of the left side of the face and weakness and unsteadiness of the left arm. The right-upper abdominal reflex was absent. X-rays of the skull showed thinning of the floor of the sella and erosion of the posterior clinoids, but no evidence of a local lesion. A diagnosis of right parietal tumor was made.

Electroencephalography showed "irregular slow activity in all leads, with maximal and much more constant abnormal activity over the right parietal lobe. This is most marked rather low in the antero-parietal region. The diffuse waves may be due to increase in intracranial pressure."

At operation a right fronto-parietal osteoplastic flap was turned to center over the area of abnormal electrical discharge. A large meningioma was found in the center of the flap.

Case 2. J. R., a male aged 37, was admitted to the Boston City Hospital in October, 1937, having 1 year's history of a gradual onset of right-sided sensory loss beginning in the hand and tongue and right-sided focal seizures beginning in the fingers. Clinical examination showed slight signs of upper motor neurone damage in the right side, with moderate diminution of all forms of sensation of a hemiplegic type on that side. Encephalog-

raphy showed slight convolutional atrophy in the right temporo-parietal region.

By electroencephalography, "a normal rhythm was seen throughout, with the exception of a few low-voltage slow waves emanating from the right temporo-occipital region, suggesting slight impairment of cortical activity in this region. If there is a lesion it is probably deep and is not involving the cortex directly." At operation an arteriovenous angioma was found in the posterior Sylvian region. A few veins presented at the surface, but it was obvious that most of the lesion lay beneath the surface of the cortex.

Case 3. E. L., a male aged 63, was admitted to the Boston City Hospital in January, 1938. He had had headaches, nausea and vomiting for 2 months, diplopia for 1 month and drowsiness and mental deterioration for 2 weeks. On examination he was drowsy and apathetic, had a poor memory and was incontinent of urine. There was doubtful bilateral sixth-nerve weakness, doubtful papilledema, and a suspicion of weakness on voluntary movement of the left side of the body. The tendon reflexes were equal, the right abdominal reflexes absent and the right plantar response equivocal. A tentative diagnosis of frontal tumor was made, the side being undetermined.

Electroencephalography showed "very high voltage slow activity in the right frontal region extending as far back as the premotor area. There was slight abnormality on the left side, perhaps due to high intracranial pressure." It was considered that there was very gross cortical dysfunction over the whole of the right frontal lobe. On ventriculography there was displacement of the right frontal horn, and at operation a hemorrhagic cyst the size of a tangerine was found in the right frontal pole 0.6 cm. below the surface. The overlying cortex was flattened and discolored.

The following case demonstrated the value of electroencephalography when clinical evidence of an intracranial lesion was lacking.

Case 4. R. McK., a female aged 22, was admitted to the Boston City Hospital in October, 1937, having had frequent petit mal attacks for 2 years and four grand mal seizures in the last year. Except for a doubtful right-sided onset, there were no localizing signs during the seizures. The only positive clinical signs were slight left-sided motor weakness and a slight increase in the tendon jerks with an equivocal plantar response in the right. The visual fields were normal. X-rays of the skull showed no abnormality. A clinical diagnosis of "epilepsy with a focus of undetermined nature in the left hemisphere" was made.

The report on the electroencephalogram was: "The left side appears normal. The right shows large waves with much abnormal activity centering in the posterior-parietal region, with a central silent area. This abnormality is very widespread and suggests much cortical change." From the type of disturbance it was thought that it might be due to a meningioma or some other destructive cortical lesion, and as the focus of discharge was so well marked, an encephalogram was strongly advised. This showed a large dilation of the temporal horn of the left ventricle, below the silent area localized by electroencephalography. A right parieto-occipital craniotomy was therefore performed, and a cyst 5 cm. in diameter was exposed in the right posterior parietal cortex. There was no overlying cortex, and the cyst communicated with the temporal horn of the right lateral ventricle, of which it was an enormous dilation. The cyst corresponded with the silent area in the abnormal discharge recorded electrically, and it was seen that the occipital pole, from which normal waves had been obtained, was unaffected by the lesion.

In 1 case where two lesions were found at autopsy, only the major lesion had been recognized by electroencephalography. The patient was in deep coma and had high intracranial pressure at the time of investigation, and an enormous area of pathologic high-voltage discharge was maximal in the right temporo-parietal region. At autopsy, a large, wedge-shaped area of ischemic necrosis was found

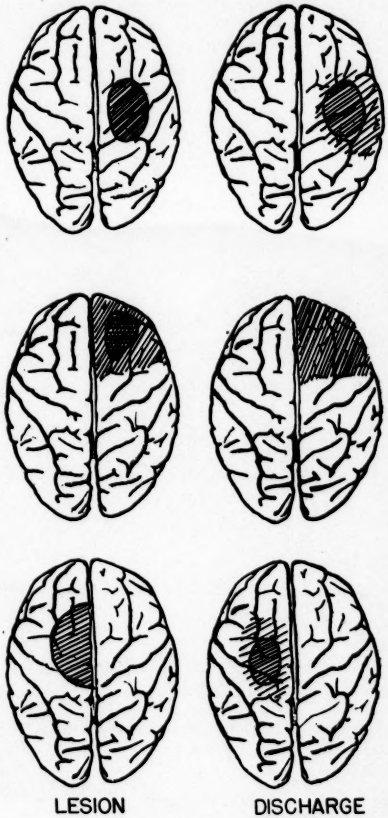

Figure 2. *Charts of the cerebral hemispheres of 3 patients in whom the lesion was seen at operation. On the left is shown the position of the lesion as drawn by the neurosurgeon after the operation. On the right is the position of the focus of abnormal activity as drawn on the report sheet given to the neurosurgeon before the operation.*

to coincide with this discharge, and a meningioma was present on the outer and lower aspect of the left frontal lobe. Subsequent examination of the record showed that a subsidiary focus was present in this region also. In 2 of the cases presenting two foci of abnormality, the position of the greater disturbance only had been verified but the possibility of multiple foci was great.

In 6 cases where a lesion was subsequently seen to coincide with a focus of abnormal electrical discharge, it had been impossible to localize the lesion by clinical methods or by x-rays of the skull; three of these which subsequently came to autopsy, were considered to be in too precarious a condition to warrant encephalography. Electroencephalography was employed in all these cases. It was successful where all other available diagnostic methods had been found inadequate.

The lesions causing the abnormal discharge were diverse. They consisted of tumors (15 cases), abscesses (6 cases), traumatic lesions (6 cases), subdural hematomas (4 cases), porencephalic defects (2 cases), and Paget's disease of the skull causing localized cortical pressure, an idiopathic local cortical atrophy, Schilder's disease, and a tuberculoma (1 case each). This series of 37 cases, therefore, confirms Walter's observation that the slow waves emanate from abnormal cortex and not from the causal lesion. Foerster and Altenburger[2] had previously shown that cerebral tumors were electrically inactive.

The negative cases in this investigation were also of interest, for in 7 a diagnosis of cerebral tumor or cerebral damage due to trauma was refuted by a normal electroencephalogram and the subsequent course of the cases suggested that this conclusion was correct. Total destruction or absence of cerebral cortex, unless gross, as in Case 4, may not be demonstrated by this method, especially if the remaining cortex is normal. This is illustrated by the following case.

Case 5. A. G., a female aged 24, was admitted to the Boston City Hospital in September, 1937, with a recent bullet wound of the left occiput. The wound was explored the day after admission. The left occipital pole was lacerated, and fragments of bullet and bone extended along a wide track into the lateral horn of the left ventricle. All damaged brain tissue was excised, and a clean cerebral defect about 2 cm. in diameter remained in the left occipital lobe. When discharged from the hospital the patient was well except for a complete right homonymous hemianopia.

Electroencephalography performed 6 weeks after the operation did not disclose any abnormally slow activity from the left occiput.

It is therefore apparent that a cortical defect is not responsible per se for the abnormal frequencies recorded. When we correlate the types of activity occurring in the neighborhood of cerebral lesions, it appears that abnormal slow waves are most evident in diffuse cortical lesions where prolonged cortical damage short of complete cell destruction is present. Such situations are found at the periphery of large meningiomas, in cortex which is being infiltrated by gliomas, in the edematous cortex overlying an abscess, and in progressive idiopathic cortical degeneration. Thus by correlating the frequency and amplitude of the pathologic waves with the position of the discharge and its extent, it is possible in some cases to surmise the nature of the lesion. When the type of electroencephalographic record is correlated with the history of the illness and the clinical manifestations of the lesion, the method may be of considerable value to the physician in assessing the nature as well as the position of the lesion.

It has been shown that many destructive cerebral lesions cause abnormally slow cortical waves. High intracranial pressure gives rise to similar slow waves which are widespread throughout the cortex. When hypertonic intravenous glucose saline is given, however, the generalized slow frequencies can be eliminated and an underlying focus of activity determined. In 1 case in this series with high intracranial pressure, after hypertonic glucose had been administered intravenously it was found that no local cortical discharge was associated with the high pressure. A clinical diagnosis had not previously been made, and as a result of the electroencephalographic report a posterior fossa decompression was performed and a tumor exposed. There is no evidence, however, that lesions in the posterior fossa can be localized by this method, and the depth of overlying tissue, combined with the difference in electrical behavior of the hind brain, makes the application of the method to such lesions of extremely doubtful value.

The results of this investigation of 80 cases confirm Walter's observation that in electroencephalography an adequate method for the localization of intracranial lesions is available.

SUMMARY

Eighty patients from a neurological and neurosurgical service suspected of intracranial lesions were investigated by electroencephalography, using a method described by Walter.

In 50 cases a focus of abnormal activity was found. In 37 of these the position of an organic lesion was established. In every verified case the position of the lesion coincided with the area of electrically abnormal cortex. In 1 case with two lesions, only the major lesion was demonstrated.

In 6 cases it had not been possible to localize the lesion, which was demonstrated by electroencephalography and subsequently exposed surgi-

cally, by any other method, and in 7 cases a negative diagnosis in the face of clinical evidence to the contrary was subsequently shown to be correct.

The results have been elaborated and their significance discussed. It is concluded that this technic is of considerable value in the diagnosis of intracranial lesions.

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OBSERVATIONS ON THE CONVULSANT TREATMENT OF SCHIZOPHRENIA WITH METRAZOL

A Report of Seven Cases

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WITHIN the last few years there has been added to the armamentarium of the clinical psychiatrist the irritant or convulsant treatment of psychosis, particularly of schizophrenia. This form of treatment was first proposed by von Meduna,[6] and is now being carried out in an increasing number of clinics in America and abroad. It is the purpose of this report to summarize the principal features of this treatment, and its application in 7 patients with schizophrenia; for it is in the latter disease that it has found its most extensive and promising application.

The treatment consists essentially of the induction of a series of convulsive seizures by the use of drugs, particularly metrazol, in dosages appropriate to the individual case. Although at first sight such treatment appears somewhat heroic, its worth as shown by the present data cannot be gainsaid, and to date very few ill effects have been reported.†

From data reported by various investigators, considerable optimism with respect to this form of treatment has been aroused. In von Meduna's[6] series of 110 patients, 54 patients underwent remissions and 56 remained unchanged. In Wahlmann's[10] series of 20 patients (including one manic-depressive who recovered), there occurred remissions in 8 patients and no change in 12. In Friedman's[2] series of 40 patients, 32 improved or had remissions. Nyirö[7] observed improvement or complete remission in 13 of 24 patients. Scheuhammer and Wissgott[8] have reported a series of 41 patients 30 of whom have completed the course of treatment; in 13 cases complete or almost complete remissions were obtained. The results were best in the catatonic and paranoid-hallucinatory patients and worst in the hebephrenic.

These writers consider the duration of the disease to be of definite prognostic significance: in 13 patients in whom the disease had lasted for one and a half years or less, the remission rate was 69 per cent, whereas in the 17 other patients, in whom the disease had been of longer duration, only 4 remissions were obtained. Of the patients with remissions, 5 have been continuously well for four or five months. Von Meduna[6] maintains that in patients who have been ill not more than six months the remission rate is from 80 to 90 per cent; this rate falls rapidly after the illness has been present for a year, and in cases of longer than four years' duration is practically nil. Sorger and Hofmann,[9] in their series of 100 patients, have reported the following data, which also indicate clearly that the prognosis with this treatment is better the shorter the duration of the disease:

DURATION OF DISEASE	NO. OF CASES	REMISSIONS		UNCHANGED	
		No.	%	*No.*	%
Acute (up to ½ yr.)	38	29	76	9	24
Subacute (up to 1 yr.)	13	7	54	6	46
Chronic (over 1 yr.)	49	13	27	36	73

It thus would appear that, even allowing for a certain tendency to spontaneous improvement, treatment by metrazol is of material advantage.

RATIONALE

On the basis of reports by various psychiatrists that schizophrenia and epilepsy are rarely if ever found together, and also that patients with frequent epileptic fits who had schizophrenic features recovered rapidly, von Meduna[6] has postulated a biologic antagonism between these two disease processes. He has therefore maintained that by in-

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†In a series of 110 patients observed for a total of about 1000 convulsions, von Meduna[6] has reported cases in which the only injuries were a dislocated arm and, in two instances, a dislocated jaw. Only 4 fatalities have been reported to date [Kennedy[5]]; 1 of these patients had aortic regurgitation and 1 a hypernephroma (both clinically diagnosable); the other 2 deaths were due to pulmonary embolism. Kennedy states the fatality rate to be 0.3 per cent.

ducing epileptic attacks in schizophrenic patients a change in the chemical, humoral, hematologic and other aspects of the organism is brought about and a possibility given for a remission. The soundness of the clinical basis for such an antagonism is doubtful, since most clinicians have observed rare epileptic schizophrenics and schizophrenic epileptics.* But it has been shown by many investigators, notably Hoskins and Langfeldt, that there are various biochemical and metabolic anomalies which characterize the schizophrenic patient, observations which Friedman,[2] who introduced the convulsion treatment in America, considers to be indicative of a type of sluggishness in the somatic economy. Friedman postulates "a functional barrier to facile absorption or assimilation of nutritive elements set up in the brain," and considers that therapy should be directed against this barrier in order that normal nutritive mechanisms may be reinstated, "thus providing an unblocked pathway for normal mental functions." With the use of metrazol, which is a medullary stimulant, he postulates that the vital centers are affected and that the supposedly sluggish vegetative nervous system is mobilized to action.

The question of whether convulsions are necessary for optimal results has been raised by Friedman, who points to the frequent occurrence of petit-mal and delirious reactions as equivalents of the usual grand-mal seizures; he is of the opinion that both delirious reactions and convulsive seizures are necessary for the best results.

It appears that the drugs employed to date are not specific, and that their importance consists entirely in their convulsant properties. For this reason the technic adopted by various investigators has been directed toward the establishment of as low a convulsive threshold as possible in order that dosages may be kept minimal. To this end Friedman,[2] for example, has advocated alkalinization and hydration for the establishment of a low convulsive threshold. He has suggested that the patient be placed on an alkaline diet for about a week preceding treatment and throughout its course; sodium bicarbonate, 2 to 3 tablespoonfuls daily, or its equivalent, is also administered; the litmus reaction of the urine is used as a check. In addition, the fluid intake is kept at a minimum of at least 2000 cc. per day. Camphor is then administered for at least three weeks, being injected intramuscularly in 25 per cent oily solution, twice daily, with an initial dose of 4 gm. of amorphous camphor, increased 1 gm. per day. Following this period, treatment with metrazol by intravenous injection is begun; the initial dose is usually 5 cc. of 10 per cent solution, increased by 1-cc. amounts to the dosage necessary to produce convulsions.

*A critique of the schizophrenia-epilepsy relation has recently been made by Nyirö.[7]

METRAZOL

Metrazol (pentamethylenetetrazol)* is an ana leptic drug which is used fairly extensively in general clinical practice as a vasomotor and respiratory stimulant. It tends to raise the blood pressure in conditions of depressed circulation, and to increase the depth of respiration. It is generally used in 10 per cent aqueous solutions. In doses larger than 3 or 4 cc. it becomes a convulsant, especially when administered rapidly. Since it is absorbed very quickly it enjoys an obvious advantage over camphor-in-oil solutions, which are administered intramuscularly and reactions to which may be delayed for as long as several hours.

The nature of the effect of metrazol on the nervous system is not clear. From the standpoint of brain function it appears that the vascular system is of primary importance and that the action of the drug is one of progressive involvement of successively higher centers, namely the carotid sinus, medulla, basal ganglia and cerebrum. The significance of the vascular system is indicated in a report by Esser and Kühn;[1] in a postmortem examination of a twenty-two-year-old laboratory assistant who committed suicide by drinking 100 cc. of 10 per cent metrazol solution they found, in addition to lesions in various organs of the body (notably the liver and heart), that the brain was hyperemic with beginning thrombotic processes, the glia and ganglion cells being apparently unaffected. The patient had died in convulsions within an hour. Esser and Kühn believed that the lesions in the heart and brain were more extensive than the amount of metrazol recovered in these tissues warranted.

TECHNIC

Friedman[2] has listed several general contraindications for the selection of cases for metrazol injection in which the clinical evidence is not clear. These are: evidence of cardiovascular disease, acute febrile infections, menstruation, abnormalities of laboratory findings, and a history of head trauma with subsequent unconsciousness.

The procedures outlined by Friedman with respect to alkalinization, hydration and camphor administration have not been followed by the present investigator. It was felt that these features of procedure represented elaborations which might well be postponed until the efficacy of the simplest procedure could be established. Hence this report deals with the effectiveness of metrazol adminis-

*The chemical and pharmacologic properties of metrazol have recently been admirably reviewed by Kennedy.[6]

tration only, no other unusual procedures having been carried out.

In the observations to be reported, the course of metrazol treatments was begun with 3 cc. of a 10 per cent solution. All injections were intravenous. The dosage was increased by 1-cc. amounts only when a convulsion of the grand-mal type had not been induced at the lower dosage. Friedman,[2] following von Meduna,[6] has established twenty to thirty seizures as the course of treatment, and both maintain that even after recovery occurs two or three more seizures should be induced; injections were given twice weekly. These suggestions regarding duration of the course and frequency of injections seem to be quite arbitrary.

With 1 exception (Case 7), injections were administered three times per week. There is some evidence (Case 7) that beneficial effects may be derived when the drug is administered daily. It is possible that even more frequent administration may be feasible.

CLINICAL OBSERVATIONS*

The sequence of events in a grand-mal seizure induced by convulsive doses of metrazol is as follows:

1. Immediately following the injection there is a latent period which lasts from four to ten seconds.

2. There then frequently ensues a short interval of gasping or coughing, followed by one usually lasting not more than ten seconds during which the patient makes thrashing movements and flails his arms and legs about, his facial expression closely resembling terror. The face is flushed, the pupils become widely dilated, and the eyes stare wildly. In some patients this phase is so brief that it is scarcely distinguishable from the succeeding one, but in others it may last as long as fifteen seconds.

3. This stage is characterized by increasingly rapid, generalized clonic twitchings. The pulse rate becomes rapid and the systolic blood pressure is elevated. Although it was felt clinically that the muscular twitchings began in the face, examination of our cinematographic records revealed that they began in all muscles of the body simultaneously. Furthermore, it was observed that the twitchings occurred on both sides of the body, also simultaneously. The eyeballs jerk upwards, the lids often close tightly, and the pupils remain dilated and do not react to light. Cyanosis becomes more and more marked, and the face and tongue may become livid. Spontaneous ejaculation, without erection, occurs in most patients, often early in this phase. The thorax is fixed, and for the duration of this phase and the next the patient is apneic. This stage lasts from five to twenty seconds.

4. At this stage the so-called "tonic" phase supervenes. It is usually the most prolonged phase of the seizure, and lasts from fifteen to forty seconds. Characteristically the picture is one of carpopedal spasm. The jaw is opened, the head is hyperextended, the eyeballs are rolled upward and sometimes outward and the shoulders are adducted. Corneal reflexes are absent. The hands, in the position of tetany, are often held just over the genitalia, or may be extended outward. The legs are extended and partially internally rotated. The great toes are maintained in extension and the small toes in flexion. There is a tendency toward opisthotonos and sometimes orthotonus. The cyanosis during this period is extreme.

5. At this stage the clonic phase again supervenes, lasting for a very short interval, the shortest of all. Then quite suddenly all clonic movements disappear. There is a cessation of movement in all muscles of the body, on both sides simultaneously. The patient takes a deep breath, signalizing the end of the period of apnea. The pupils often contract with the onset of breathing, but may redilate or manifest hippus. The breathing becomes stertorous; salivation is very marked. The cyanosis rapidly disappears.

6. The patient now is seen to be in a stuporous state. Occasional spontaneous clonic twitchings may be noted. Myotatic irritability may be marked. The deep reflexes are usually absent or sluggish. There remains some cyanosis, particularly of the lips and ears. In only 1 of our patients was vesical incontinence noted, and this occurred only infrequently. Rectal incontinence has not been noted. These observations concerning sphincter control are in disagreement with those noted by other writers, who report vesical and rectal incontinence as quite frequent. This may be due to the fact that previous overhydration had been a feature of their experimental regimen. The stuporous state lasts for a variable period, sometimes as long as ten minutes, after which there appears to be a gradual return to the former state of consciousness, lasting fifteen or twenty minutes. During the early part of this stuporous phase the patient is completely relaxed; he does not answer questions or obey commands. Sleep may supervene. As time goes on, however, he becomes more and more re-

*_The nature of the convulsions_ was studied cinematographically in collaboration with Dr. Joseph M. Looney, director of laboratories, Worcester State Hospital.

sponsive.* An invariable feature during this phase is retrograde amnesia. This symptom disappears within an hour of the beginning of the seizure. However, the amnesia for the convulsion itself is persistent. Some patients tell of various peculiar experiences just after the injection, such as "The room rotates around and around" — "I see a hundred people that look like you" — "There's a terrific cracking in my head" — "I see black." These experiences are apparently quite frightening and may account, at least to some extent, for the great fear many patients have of the treatment.

It seems worth while to emphasize the probable significance of this fear. After two or three injections some of the patients begin to complain bitterly of the treatment and offer considerable resistance. They say that they are sure they are in no need of it, that it does them harm of one sort or another, that it makes them feel that they are going to die. In some clinics an attempt is being made to overcome these preinjection states of agitation by narcosis, especially with insulin, a suggestion first made by Klaesi in 1937.†

The foregoing description pertains to the grand-mal type of seizure. Following about one fourth to one third of the injections, seizures which appear to be of the nature of petit-mal, or of epileptic equivalents, occur. These take diverse forms. Usually they consist of more or less isolated twitches, which last a few seconds, usually involving the face and arms; or the patient's facial expression may merely become fixed and apprehensive. Sometimes he becomes quite excited and hyperactive, performing numerous bizarre movements, such as racing about the room, scratching his head or body, fighting or climbing about on the bed. Stupor apparently does not ensue. The patient has a persistent amnesia for this form of seizure also.

It is of interest that, unlike patients who have just had a true epileptic attack, our patients never complained of lameness or stiffness of the muscles. The reason for this may be inferred from our records: it seems clear that the muscular activity produced is not violent. Overflexion and overextension of the muscles, resulting in strained ligaments, apparently do not occur. An exception to this observation may exist in 1 of our patients (Case 1), who dislocated both shoulders.

*The data on the nature of the return to the former state of consciousness will be reported separately. They offer some illumination of the problem of postconvulsive confusion.

Von Meduna[8] has observed that various blood and urinary changes occur. The former consisted in an increase of neutrophils and an increase of lymphocytes; the blood-picture changes were greater in patients who underwent a remission. The acidity of the urine was increased (about 25 per cent), as were the ammonia (14 per cent) and the phosphates (10 per cent); the chlorides were reduced (25 per cent). These findings support his opinion that the seizures are epileptic. Sorger and Hofmann[9] reported that during the seizure and immediately after, the eosinophils, monocytes and polymorphonuclear leukocytes decreased and the lymphocytes increased; after two or three hours the eosinophils disappeared, and there was a decrease of monocytes and lymphocytes and an increase of polymorphonuclear leukocytes. The blood picture again became normal about six hours after the seizure. These men also report a rise of the blood-sugar level immediately after the seizure, the maximum being reached after about thirty minutes, followed by a rapid fall to normal.

†The concomitant utilization of insulin induction also seems to lower the convulsive threshold, a smaller amount of metrazol, therefore, being sufficient (Georgi,[8] Georgi and Strauss[4]).

CASE REPORTS

For purposes of this report 7 illustrated cases are cited. These patients were selected as fairly representative of schizophrenic patients usually found in state hospitals. They are of various types and have been ill for various periods of time.

Case 1, age 24. The onset of schizophrenia had been quite gradual over about 1 year, and was manifested by a change in personality. The patient had become quite irritable, complained of headaches, seemed discouraged, and said that he was a "wreck." He began to talk foolishly. On the ward he was quiet but often moved about restlessly. There were numerous mannerisms of the eyes, mouth and hands. His speech was jerky and scattered, his mood shallow. He admitted having heard voices in the past. There were no frankly paranoid ideas.

Metrazol treatment was begun, but after three injections, the last of which was 5 cc., the patient dislocated his right shoulder during a seizure and treatment was discontinued. It was resumed after 6 weeks, but after two injections, the second of which was 4 cc., he dislocated his left shoulder and it was decided to discontinue treatment indefinitely. During the first course he had two seizures and during the second only one. His clinical condition remained unchanged.

Case 2, age 34. The patient was admitted in 1925, at the age of 22, and has since resided on the disturbed ward. The onset occurred some months previously, when he gave voice to various paranoid ideas and was obviously responding to auditory hallucinations. On admission he was restless and complained of various ideas of persecution. The course since admission was that of progressive deterioration, the patient eventually becoming almost entirely mute and presenting a picture of speech and general motor stereotypy. He waved his arms about and danced around the ward in a peculiar manner, making buzzing sounds, sometimes for hours at a time. Wet-pack treatment and chemical sedation were frequently necessary.

Metrazol injections were begun and given in doses up to 7 cc. until twenty convulsions had been induced. The patient had two convulsions in doses up to 6 cc., but the remaining convulsions were induced with 7 cc. The clinical condition remained essentially unchanged except for a frank diminution of the stereotyped mannerisms and hyperactivity, which largely disappeared.

Case 3, age 18. Three years before admission the patient had become absent-minded, uninterested and seclusive. He talked in a peculiar manner of dying, of mental telepathy and of general muscular weakness. On admission he admitted that he felt peculiar and heard voices. He was quite apathetic. He had been given a course of insulin treatment by Dr. Cameron with no striking change in his clinical condition.

Metrazol treatment was carried out for a course of twenty convulsions. The patient received 25 injections up to a maximum of 10 cc.; six fits occurred at 7 cc. and six at 10 cc. No essential change in the clinical condition was observed.

Case 4, age 26. The onset of schizophrenia apparently

occurred 3 years before admission, with persecutory delusions and bizarre visual and auditory hallucinations. A partial remission occurred for a few months, but the patient again became ill, with essentially the same clinical picture. On admission he was preoccupied, unco-operative, and disinclined to talk. He had numerous persecutory delusions and visual, auditory, and olfactory hallucinations. He was given a full course of insulin treatment by Dr. Cameron and manifested a partial remission which lasted several months, but again relapsed to his former clinical state.

Metrazol treatment was carried on until twenty convulsions had been induced. Twenty-three dosages were necessary, gradually increasing to 7 cc. per dose. The clinical condition improved markedly after the eighth seizure. The patient said that for the first time in years he felt quite normal. His speech became active and lively, but the voices, in the form of whispers, persisted. Some of the persecutory delusions also remained, but did not disturb the patient. This marked improvement persisted for about 3 weeks, during which treatment was continued. The patient then underwent a partial relapse. Although a fit had been originally induced with 3 cc., none was subsequently induced until 7 cc. was reached and the patient remained at that dosage. At a recent examination he complained that his memory was poor and thoughts "stuck" in his mind. On the other hand he felt better than he had previously, except for the period of marked clinical improvement.

Case 5, age 24. This patient had for years been concerned with his state of health and had exaggerated his somatic complaints. About 3 years before admission he began to talk unceasingly of his health. He lost interest in everything else. He gave voice to many bizarre ideas, such as that the bones of his head were soggy and decayed, that his forehead and nose had sunk in, that his palate had fallen, that his head expanded and contracted rhythmically, and that the bones in his chest were soft. On admission to the Worcester State Hospital he was quite emaciated, and referred constantly to his somatic complaints.

Metrazol treatment was carried out until a course of twenty convulsions had been completed. Twenty-five doses were necessary, at increasing levels to a maximum of 14 cc. When the course was about half complete the patient suddenly announced that he felt much better, but he again relapsed. From time to time over the ensuing weeks he denied all his somatic complaints for as long as a day or two at a time, but after the seventeenth convulsion his complaints entirely disappeared. Treatment was stopped after 20 seizures because the patient's improvement seemed to be quite permanent. He gained 8 lb. and seemed quite interested in returning home and finding a job. He was discharged in a complete remission.

Case 6, age 29. The patient had been a vagrant for many years and was admitted because he was actively hallucinated, talked to himself and seemed silly. On the ward he was markedly overactive, and dashed for the door in an excited manner. His speech was quite disjointed. It was necessary to keep him in seclusion for a year after admission because of his excitement and untidiness.

Metrazol treatment was carried on for eleven injections, during which the patient had six convulsions. A maximum dosage of 9 cc. was reached. The patient improved markedly, became quiet and co-operative and dressed himself, and it was possible to keep him on the ward; although he still dashes toward open doors, he is entirely manageable. Treatment was discontinued because the patient's improvement was so marked that it was felt unwise to prolong it—a procedure which may be unjustified.

Case 7, age 28. Five months before admission the patient became seclusive and ate poorly. He expressed paranoid ideas and was actively hallucinated. On admission he was unco-operative and resistive, and soon thereafter became extremely excited. He was antagonistic and threatening and had to be kept in seclusion. Constant pack treatment was necessary. He refused to dress, was untidy and had to be tube-fed. He became quite emaciated. The picture seemed to be one of an acute excitement with a very grave prognosis.

Four daily injections of metrazol were administered, and since he failed to react after one injection at 3 cc., the dosage was raised to 4 cc. to induce two of the three seizures. Immediately after the second seizure he asked for food for the first time in several months. After the third he again asked for food. The same day he became quiet and co-operative and thereafter dressed and fed himself. It was no longer necessary to keep him in seclusion. In the ensuing three weeks of hospitalization the patient appeared quite normal. Although on one occasion he complained of hearing voices at night, these hallucinations disappeared and the patient on discharge was entirely symptom-free. He gained 25 lb. He referred to his previous illness as a nightmare, but beyond this said he could not remember or understand what had occurred.

The patients reported here, all male schizophrenics, had been ill for periods of from five months to about fifteen years. Following treatment, 3 patients remained unchanged, 3 improved—2 quite markedly—and 2 manifested complete remissions. The most dramatic recovery occurred in an excited patient who had been ill about six months, but recovery also occurred in a patient who had been ill for many years.

From this limited number of cases it is impossible to formulate any generalizations as to the prognosis under this form of therapy in terms of the duration of the disease. However, one may say roughly that the prognosis appears better in patients in whom the disease process is recent. And it would appear that the improvement rate, even in this generally unfavorable group of patients, is fairly high.

SUMMARY AND CONCLUSIONS

A brief review of the rationale and efficacy of the convulsant treatment of schizophrenia has been presented, and 7 cases of representative schizophrenics treated by this method are recorded. The simplest manner of administration of this therapeutic procedure, namely intravenous injection of metrazol over a period of time, has been described. The nature of the resulting grand-mal convulsion, from clinical and cinematographic observations, is described. The results of other investigators who have reported more extensive series are presented; from their data it seems

quite clear that the prognosis is better the earlier in the course of the disease process the treatment is begun.

The question arises in this connection, as in all therapeutic procedures in schizophrenia, of the true worth of metrazol injection. Disappointment, often after long optimism, has been the rule. Probably final judgment must be reserved until a sufficiently large body of data has been placed on record and the permanence of improvement or complete remission has been established after a five-to-ten-year period. Strict comparisons with the spontaneous remission rate are essential. It seems from these preliminary data that the convulsant treatment of schizophrenia arouses considerable hope, and is therefore worthy of more extensive investigation. The theoretic basis for this form of treatment is still uncertain, and presents numerous problems. The psychologic factors involved, especially the fear of treatment that is induced in many patients, merit the most careful evaluation.

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SPONTANEOUS THYROID STORM ASSOCIATED WITH DIABETIC ACIDOSIS AND PARALYTIC ILEUS

Report of a Case With Autopsy Findings

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IN A search of the available literature I have been unable to find another case presenting spontaneous thyroid storm associated with diabetic acidosis and paralytic ileus. Hypoglycemic convulsions followed by pulmonary edema terminated the course in the patient reported herewith.

CASE REPORT

A 22-year-old American, white, married newspaper bundler (B. C. H. No. 875116) entered the hospital October 3, 1937, because of diarrhea and vomiting of 1 week's duration. His health prior to this time had been good. Except for a moderate degree of nervousness during the previous month, there were no significant facts in his social, family or past history.

Starting one week before entry the patient began to have attacks of diarrhea, with five to seven yellowish-brown watery movements daily. With them mild, cramp-like abdominal pain occurred. The stools were never clay-colored, contained no pus or blood and were not associated with tenesmus. Vomiting developed 3 days prior to entry and persisted, being most marked 5 to 30 minutes after meals. The vomitus contained, for the most part, undigested food, and the attacks were preceded by mild nausea.

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Anorexia was marked and a weight loss of 15 lb. was noted during this week. No icterus was apparent. In addition to these gastrointestinal symptoms, palpitation became annoying. The patient was nervous, restless and unable to sleep. He complained of sweating and of feeling warm, yet had no chills or chilliness. Nocturia, increasing to seven times, developed. Weakness prevented activity and forced continued rest in bed. For several days before entry the vision seemed blurred. Two days prior to admission a rash appeared on the face and chest.

On physical examination the patient was a small, emaciated youth, rational but severely prostrated. He weighed approximately 130 lb. The hair distribution and texture, and the skull, ears, nose and throat were all normal. Both eyes were symmetrical and prominent to a moderate degree, and showed lid lag and poor convergence. A slight puffiness of the lids was noted. The pupils reacted to light and accommodation, and ophthalmic examination revealed a clear media and normal fundi. The tongue was dry and coated and exhibited no tremor. There was a marked acetone odor of the breath. The neck was not stiff, and the carotids pulsated strikingly. A generalized, pea-sized, non-tender adenopathy was accentuated by the degree of emaciation. The thyroid gland was not palpable, nor did it exhibit any nodules, bruits or thrills. The trachea was in the midline and there was no trace of tracheal tug. The lungs were resonant, the breath sounds normal, rales absent, and the respirations 32.

The heart was not enlarged, and on palpation revealed

marked precordial activity. The aortic second sound was greater than that at the pulmonic area. No murmurs could be detected, and the heart sounds were loud and clear. The rate was 160, and the rhythm regular. Very loud pistol-shot sounds were heard over all arteries, and the patient had a Corrigan pulse. The arteries were normal in size and consistence. A blood pressure of 360+/0 in both arms was recorded on several occasions. Unfortunately the spring type of sphygmomanometer was not checked with the mercury type.

The skin was warm but not moist. There was a sparse, discrete, maculopapular rash on the face and chest with lesions measuring 1 to 2 mm. in diameter. The abdomen was tense but not distended or tender, and revealed no masses. The liver and spleen were not felt on repeated examinations. Tremor of the hands was absent, and the reflexes were active. The temperature on admission was 101°F.

On admission repeated urine examination showed a specific gravity of 1.025, no albumin, complete reduction for sugar and a 4+ acetone test; only occasional white and red cells appeared in the sediment. The fasting blood sugar was 217 mg., the nonprotein nitrogen 57 mg., and the carbon-dioxide combining power 22 vol. per cent. Two blood cultures and one blood Hinton test were negative. The white-blood-cell count ranged between 15,000 and 19,000 with 98 per cent polymorphonuclears and 2 per cent lymphocytes. The blood smear was otherwise normal. The hemoglobin was 92 per cent and cholesterol 75 mg. per cent. Two electrocardiograms showed sino-auricular tachycardia.

The patient was treated intravenously with saline solution containing 10 per cent glucose and 400 units of insulin during the first day. By the morning of the following day he was quieter and free of acetone, but still showing a red, sugar reduction in the urine. The blood pressure was now 170/85. The pulse rate ranged between 140 and 180, the respirations were 30 to 35, and the temperature was 100 to 102°F. Vomiting and diarrhea were not present.

On October 5 the patient began to hiccough and complained of mid-abdominal discomfort. Two hours later he had fecal vomiting for the first time; this persisted for half an hour, the patient lapsing into coma. The abdomen became rigid and level; flatness on percussion could be elicited in the flanks as well as in the midabdomen. The blood pressure was at a shock level, with the pulse at 180 and weak, and a cold, clammy skin. Gastric lavage was started and yielded 2300 cc. of fecal, fluid material; the clinical response was dramatic. The blood pressure rose to 110/40 as consciousness returned. Later that day it was 140/80. A Wangensteen apparatus was then set up to syphon off excessive gastrointestinal contents; it had to be left in place, because as rapidly as intravenous fluids were given, an almost proportional accumulation of fecal fluid appeared.

On October 4 and 5 the patient was given 10 min. of Lugol's solution every four hours, and intravenous fluids were maintained almost constantly. On October 6, 50 min. of this solution were added to each liter of normal saline and glucose given intravenously. The patient continued to become progressively irrational and lost weight rapidly.

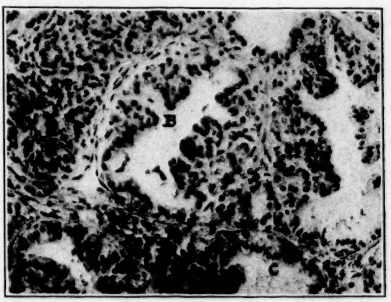
On October 6 the nonprotein nitrogen was 87 mg., blood sugar 240 mg. and chlorides 616 mg. per cent. Acetone reappeared in the urine, glycosuria having persisted throughout the hospital stay. The skin was only mildly warm, and not flushed or dry. At no time did the temperature rise over 102°F., probably because of the intermittent acidosis present.

During October 7 and 8 the patient was drowsy yet could be roused easily. On October 9 the blood sugar was 30 mg. per cent, and concentrated glucose was given intravenously. Before much of this had been given, tonic and clonic convulsions occurred, followed by rapidly developing pulmonary edema and death.

Autopsy Report. The essential findings 4½ hours post mortem were as follows. The thyroid was moderately enlarged and weighed 40 gm. Its external surface was brown and smooth. The cut surface was dark brown and granular, the granules being 0.2 to 0.3 cm. in diameter and of a lighter color than the surrounding tissue. The cut surface of the lungs was red and crepitant, and small amounts of pink, frothy fluid could be expressed from all areas. The stomach contained several hundred cubic centimeters of black, foul-smelling fluid. The gastric mucosa appeared dark red, and irregular, shallow ulcerations, 0.2 to 0.3 cm. in diameter, were scattered throughout. The first two portions of the duodenum were distended, and its mucosa was gray. Scattered throughout the terminal portions of the ileum and ascending colon were areas 5 to 10 cm. in width in which the mucosa was red yet contained no ulcerations. The liver weighed 1750 gm. and showed no gross abnormality. The entire aorta appeared narrower than usual, and the arch of the thoracic aorta had a circumference of 4.5 cm. Scattered through the abdominal and thoracic aortas were small, yellow, atheromatous plaques.

The anatomical diagnoses were: hypertrophy and hyperplasia of the thyroid gland; acute gastritis; early atherosclerosis of the thoracic and abdominal aortas.

Cultures of the heart's blood showed no growth.



Courtesy of Dr. G. Kenneth Mallory

Figure 1. *A photomicrograph of medium power showing marked hyperplasia of thyroid gland:*

A — *an area of acini without colloid;*
B — *papillary projections into acinus;*
C — *columnar epithelium.*

Microscopic examination of the thyroid showed three distinct areas of marked hyperplasia. There were many acini without colloid; another area revealed large acini with marked papillary projections of their walls. In still another area the acini were lined with epithelium of a columnar type. Around a small, necrotic, cardiac muscle bundle there was a small focal accumulation of polymorphonuclear leukocytes. In the walls of the bronchi and immediately adjacent alveoli were collections of polymorphonuclear leukocytes and a few lymphocytes. The

spleen contained moderate amounts of phagocytosed hemosiderin. There was extensive ulceration of the esophageal epithelium. The submucosa was diffusely infiltrated by large numbers of polymorphonuclear leukocytes and contained small deposits of fibrin and thrombosed blood vessels. There were large areas of extravasated red blood cells in muscular layers and diffuse infiltration of these layers by polymorphonuclear leukocytes. There was an ulceration of the gastric mucosa, and in this area the surface was composed of polymorphonuclear leukocytes, red blood cells, fibrin and necrotic tissue. There were large areas of interstitial hemorrhage in the submucosa, and scattered throughout were many polymorphonuclear leukocytes. Occasional polymorphonuclear leukocytes and histiocytes were noted in the muscular layers, and there was a small deposit of fibrin on the serosal surface. The interstitial pancreatic tissue showed small numbers of polymorphonuclear leukocytes. These cells were occasionally present in small masses around the islands. The liver appeared to be negative. Since no vacuoles were seen, glycogen and fat stains were not done. In the adrenals there were foci of necrotic cortical cells with early infiltration by polymorphonuclear leukocytes. There was marked hyperactivity of the bone marrow.

The microscopic diagnoses were: marked hyperplasia of the thyroid gland; acute bronchitis; acute hemorrhagic gastritis; focal necrosis of the corticoadrenal cells.

Unfortunately permission to examine the head was refused, so that the pituitary gland could not be examined.

DISCUSSION

Hyperthyroidism and Diabetes Mellitus. It has long been known that disturbances in carbohydrate metabolism occur in hyperthyroidism.[1, 2, 3] Opinions differ widely as to the character, frequency and conditions of these anomalies.[4, 5, 6, 7] Some authors find glycosuria present in only a small percentage of patients with exophthalmic goiter, while others have found it in over 90 per cent of their cases. Consequently Joslin, Root, White and Marble[8] have suggested an arbitrary standard for diagnosis of diabetes in hyperthyroidism, namely a blood sugar of 0.15 mg. per cent fasting, or of 0.2 mg. per cent or more after meals, in addition to glycosuria.

In more than half the uncomplicated cases of exophthalmic goiter studied by Andersen[9] the fasting blood-sugar level was a little higher than is considered normal. The alimentary blood-sugar curve was increased in height and duration. The latter was most marked in the more severe cases; yet there were several exceptions.

The mechanism of the sugar-excretion threshold, according to Cushny[10] and later Ni and Rehberg[11] depends upon the filtration of glucose through the glomeruli and its reabsorption in the tubules. This reabsorption is dependent upon the blood-sugar concentration, and when this reaches a certain level, known as the excretion threshold, the glucose contained in the glomerular filtrate can no longer be absorbed completely in the tubules and glycosuria results. Which factors determine this reabsorption of glucose has not yet been settled, but it is the predominant view that the influence is of a hormonal nature, a hormone from the pituitary perhaps being responsible.

Joslin and Lahey[12] have indicated the seriousness of this clinical combination. The average duration of life for their group of cases was 3.4 years.

Hyperthyroidism and Hypoglycemia. Blood-sugar studies on postoperative thyrotoxic patients observed by Holman[13] showed a rather sudden onset of hypoglycemia twenty-four to thirty-six hours after operation in 2 patients, who responded dramatically to glucose therapy. Here manipulation of the gland during operation resulted in flooding the general circulation with a large amount of thyroid secretion. Consequently a tremendous increase in metabolic processes occurred, causing a utilization of available carbohydrates, especially the glycogen reserve of the liver and muscle tissues. Now, if there is sufficient active thyroid secretion in the circulation — which may be the case either in the spontaneous or the postoperative thyroid storm — there will come a time when all available carbohydrate supply of the body is depleted and hypoglycemia is precipitated. That this condition occurred as a terminal feature in the case presented is shown by the sugar determination of 30 mg. per cent after a fairly persistent hyperglycemia and glycosuria. The remarkable loss of body weight while on the ward appears to have paralleled the tremendous amount of sugar excreted in the urine.

Pulmonary edema was noted clinically as a terminal feature, a finding which Maddock, Pedesen and Coller[14] have commented upon as a frequent terminal event associated with increased amounts of adrenine in the blood stream in cases of thyroid crisis, while neglecting the role of hypoglycemia. These authors report 3 typical cases of severe postoperative thyroid crisis in which pulmonary edema developed; 1 patient who recovered showed a negative chemical test for adrenine, whereas it had previously been positive. These authors believe that this respiratory complication has been overlooked in many cases in the past, the excessive mucus and the cyanosis being attributed to bronchopneumonia and tracheitis.

If blood-sugar studies are done more frequently, more cases of thyroid storm may show, as did ours, a sudden onset of hypoglycemia, which probably stimulates the adrenal medulla to secrete large amounts of adrenine into the blood stream and results in the terminal pulmonary edema. Another possibility is acute left ventricular failure, due to the hypertension and causing pulmonary edema.

Acute Abdominal Symptomatology in Hyperthyroidism. Kraus[15] and Desbouis[16] describe cases of acute abdominal pain occurring during the

course of thyrotoxicosis. There are very few references to this factor in the American literature. Robertson, Wohl and Robertson[17] describe 3 cases of moderate hyperthyroidism with abdominal symptoms simulating a surgical abdomen. Acute attacks of vomiting and abdominal pain may be due solely to overactivity of the thyroid gland. With the administration of compound solution of iodine the symptoms of thyrotoxicosis and abdominal pain are entirely relieved; but when iodine is omitted the thyrotoxic symptoms reappear.

Differentiation is at times impossible, especially if we bear in mind the rather high incidence of duodenal and gastric ulcers in patients with thyrotoxicosis.[18] The acute abdominal symptoms of diabetes mellitus must also be considered in the differential diagnosis. It is possible that in our case there was a summation of the effect of the diabetic and thyrogenic factors upon the gastrointestinal tract, resulting in paralytic or adynamic ileus, a finding not encountered in the literature of hyperthyroidism or of diabetes mellitus. It was this almost persistent gastrointestinal catastrophe which made it impossible to maintain an adequate caloric intake.

Thyroid Storm or the Comatose Form of Graves's Disease. The hyperthyroid aspect of this case conforms in many respects to Zondek's[19] classical description of the comatose type of Graves's disease. Some mild infection such as tonsillitis or bronchitis may cause the tremor and restlessness characteristic of Graves's disease to give place suddenly to intense asthenia, or there may be no such preliminary. Toxic phenomena such as wasting, sweating or tachycardia may suddenly occur, even though the metabolic rate is not much increased; also, exophthalmos and goiter may be slight or absent.

After a variable period of excitement consciousness grows dimmer, a peculiar rigidity develops in which facial expression is lost, and the countenance assumes a blank look. Later the patient may lose consciousness almost completely. Except for lack of rigidity of the limbs, the condition resembles catalepsy. The mouth and other mucous membranes are extremely dry. A serious symptom is difficulty in swallowing, which may lead one to suspect bulbar paralysis.

At the Massachusetts General Hospital, Means[20] has reported that from 1924 to 1935 there have been 14 patients with postoperative storm, 10 (71 per cent) of whom died. Consequently thyroid storm still constitutes an important cause of death.

The Chronic Form of the Acute Syndrome. Cases of Addison's disease following thyrotoxicosis have been reported by Etienne, Etienne and Richards,[24] Chauffaud and Girot,[24] and Brenner.[25]

That the adrenal cortex inhibits thyroid activity has been shown by Marine and Baumann.[26] They found that incomplete destruction of the adrenal cortex in rabbits with intact thyroids — but not in those with thyroids removed — caused a rise in body temperature, and they suggested that adrenal insufficiency might be the cause.

Recent evidence[27, 28] suggests that the adrenalectomized animal develops hypoglycemia because it cannot form liver glycogen from endogenous sources; this may be the cause of the hypoglycemia so often noticed in this disease, and may explain the occurrence of the convulsions and coma — in the absence of hemoconcentration or changes in blood chemistry — that are characteristic of Addisonian crisis.

Anderson and Lyall[23] described a case of thyrotoxicosis in a thirty-year-old single woman, who developed Addison's disease seven years after x-ray therapy. Coma and muscular spasm which occurred as terminal symptoms seemed directly related to extreme hypoglycemia rather than to Addisonian crisis, since plasma electrolytes and the blood volume were within normal limits.

SUMMARY

A case of spontaneous thyroid storm, diabetic acidosis and paralytic ileus which terminated in hypoglycemic convulsions and pulmonary edema is reported, with autopsy findings.

An explanation offered for the mechanism of this death is that spontaneous liberation of an enormous amount of active thyroid secretion into the general circulation precipitated the hypoglycemic convulsions, which were followed by the rapid development of pulmonary edema and death.

It is suggested that a summation of the extreme effect of both the thyrogenic and the diabetic factors upon the gastrointestinal tract resulted in paralytic ileus.

The importance has been indicated of following the condition with frequent blood-sugar determinations to discover the critical period when exhaustion of the body's glycogen supply occurs, and the value of glucose therapy has been noted.

I am indebted to Dr. Joseph E. Hallissey for permission to publish this case.

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THE INCIDENCE OF TUBERCULOUS INFECTION IN SURGICALLY REMOVED TONSILS

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MANY workers have reported from time to time on the frequency of tuberculous infection in extirpated tonsils. Most of this work has been done in the clinics of general hospitals. Weller[1] in 1921 reported a study of surgical material received routinely in the laboratory from 1906 to 1919; the incidence of histopathology of tuberculosis in 8607 specimens was found to be 2.35 per cent. Mullin[2] analyzed 400 cases and found an incidence of 4.3 per cent, but in 60 per cent of these cases there was evidence of tuberculosis elsewhere. Wilkinson[3] reported that whereas the incidence of tuberculous infection in 600 tonsils removed in 1900 was 1.3 per cent, this figure dropped to 0.5 per cent for 10,000 tonsils removed from 1923 to 1927. Magee[4] carried on this kind of study to determine whether the decreased incidence of most forms of tuberculosis would be reflected in the tonsillar tissue examined. She showed the incidence in 6280 tonsillectomies performed from 1933 to 1935 to be 0.4 per cent. This is a definite decrease as compared to 2.35 per cent reported[1] from the same clinic in 1920. I have seen no reports in the literature on the frequency of tuberculous infection encountered in tonsils removed in institutions for tuberculous patients.

In this communication I report the results of 202 tonsillectomies performed on patients, mostly children, at the Lakeville and North Reading state sanatoriums between 1933 and 1937. Of these patients, 172 were operated on at Lakeville, where all forms of extrapulmonary tuberculosis are treated, and 30 at North Reading, where the childhood type of pulmonary tuberculosis is treated. The indications for removal of the tonsils were chiefly their injected and cryptic appearance, a history of frequent sore throat, and the presence of suppurative cervical lymph nodes. We have found that the cervical-lymph-node cases almost invariably benefit from tonsillectomy, and urge this procedure in such cases as a matter of routine.

Of the 202 specimens examined histopathologically, 21, or 10 per cent, showed tuberculous infection. Six of these were removed from the 30 patients at North Reading, and 15 from the 172 patients at Lakeville. The infection found in the removed tonsils may be considered as latent, for in no case was there a preoperative diagnosis of tuberculosis of the tonsils. The tuberculous lesions for which the patients were admitted to the sanatoriums are listed in Table 1, together with the appearance of the tonsils on admission and other data of interest. The throats did not differ in appearance to any great extent from those of patients in whom tuberculous infection was not found. In fact, they resembled those seen in any group of people of a corresponding age with tonsils remaining. Of interest, however, is the fact that 10 of the 21 patients had palpable cervical lymph nodes.

Many workers[5] support the view that the tonsil or the pharyngeal mucous membrane is the portal of entry for the tubercle bacilli. With the mucous membrane intact, the healthy tissue can resist the bacilli, but when its continuity is broken, either

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by a tear or by disease, the organisms may easily enter the deeper structures. From there they may travel to the cervical lymph nodes or to any other part of the body; or they may lie dormant, thus becoming a possible source of further auto-infection.

It is not my purpose to prove that these tonsils were or were not the primary foci of the tuberculous lesion that brought the patient to the sanatorium. My desire is to emphasize the high percentage of tuberculous infection found in the tonsils of these patients, who were suffering from one form or another of the disease.

If we assume that the tonsils are the first structures to harbor tubercle bacilli, then their early removal, in such cases, may prevent the further spread of the infection to more vulnerable parts of the body. On the other hand, if we discount the above view, we must bear in mind that tuberculous infection in the tonsils is always a potential source of subsequent auto-infection with the development of other and more serious lesions. The necessity for the removal of all abnormal or suspicious tonsils in cases with tuberculosis thus becomes apparent. The routine examination of all tonsils removed, whether in a sanatorium, a general hospital or at home, also appears desirable.

Table 1. *Data on 21 Cases in Which Tuberculous Infection Was Found to Be Present in Surgically Removed Tonsils.*

CASE	AGE	TUBERCULOUS LESION FOR WHICH ADMITTED	PREVIOUS SORE THROAT	CONDITION OF CERVICAL LYMPH NODES ON ADMISSION	CONDITION OF TONSILS ON ADMISSION
	yr.				
1	2	Peritonitis	Infrequent	None palpable	Not remarkable
2	6	Spine	None	1 on left side	Not remarkable
3	3	Knee, right	None	None palpable	Slightly enlarged
4	7	Ankle, left hilum	Frequent	Some on each side	Large, injected
5	7	Cervical adenitis	None	Numerous and enlarged	Enlarged, injected
6	2	Spine	None	None palpable	Enlarged, not injected
7	3	Spine	None	None palpable	Hypertrophied, not injected
8	3	Spine	None	Several palpable	Enlarged, injected
9	12	Hip	None	Several palpable	Enlarged, not injected
10	12	Cervical adenitis	Occasional	Several palpable	Enlarged, injected
11	4	Cervical adenitis	None	Mass of glands (left)	Removed before admission; adenoid tissue positive
12	27	Skin	Occasional	Few palpable	Small; anterior pillar injected
13	20	Nephritis	None	Few and small	Not remarkable
14	3	Knee, left	None	None palpable	Small, slightly injected
15	9	Spine, hilum	Occasional	None palpable	Hypertrophied and cryptic
16	5	Childhood	None	Anterior, cervical palpable	Enlarged, cryptic
17	3	Childhood	None	Few palpable	Medium-sized
18	12	Childhood	Occasional	None palpable	Enlarged, cryptic
19	10	Childhood	None	None palpable	Medium, cryptic
20	7	Childhood	None	None palpable	Enlarged, cryptic
21	11	Childhood	None	History of drainage	Medium, enlarged, cryptic

SUMMARY AND CONCLUSIONS

Of 202 tonsils removed from patients at the Lakeville and North Reading state sanatoriums, 21, or 10.4 per cent, showed tuberculous infection.

These tuberculous tonsils, in general, by appearance and behavior could not be distinguished from chronically infected tonsils ordinarily encountered.

The removal of all diseased tonsils in children and adults suffering from tuberculosis is recommended.

All tonsils thus removed should be subjected to a careful histopathological examination.

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CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

ANTEMORTEM AND POSTMORTEM RECORDS AS USED IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT, M.D.

TRACY B. MALLORY, M.D., *Editor*

CASE 24241

PRESENTATION OF CASE

A forty-two-year-old, native-born, white housewife entered the hospital with the complaint of fatigue and weakness of eight months' duration.

She was entirely symptom free until eight months before entry when, over a period of two months, she had four attacks of nausea, vomiting and "gas" accompanied by epigastric and right upper quadrant pain radiating to the midscapular region. The attacks lasted several hours and were severe enough to require hypodermic injections for relief. She was advised to have an operation but refused; and because of apprehension ate very little for the next month, with consequent loss of weight. Her physician, however, finally made her take a well-rounded, low-fat diet, but in spite of this she continued to lose weight; losing a total of 23 lb. before she entered this hospital. She had no attacks of pain and nausea during the six months before entry, but she had frequent attacks of epigastric fullness and gas on the stomach. She also worried a great deal and was very easily fatigued. She had no jaundice, hematemesis, melena, diarrhea, clay-colored stools, change in bowel habits or change in the color of her urine.

Nine years before entry she had a left salpingo-oöphorectomy for acute lower abdominal cramps and fever. Twenty months before entry a mole was removed from her left forearm. At the time of the operation the surgeon noticed flecks of pigment deep in the subcutaneous tissue beneath the lesion and did as wide an excision as possible. He advised an axillary dissection which was refused. The pathological report was melanotic sarcoma. Her past history was otherwise essentially negative, and her family history was noncontributory.

Physical examination revealed a thin, undernourished woman in no acute distress but quite apprehensive. There was tenderness to deep palpation in the right upper quadrant, and liver dullness extended two fingerbreadths below the costal margin although the edge could not be palpated. The heart and lungs were negative, and the blood pressure was 106 systolic, 70 diastolic.

The temperature was 98.6°F., the pulse 90. The respirations were 20.

The urine had a specific gravity of 1.008 and contained a slight trace of albumin. The blood showed a red-cell count of 3,880,000 with 70 per cent hemoglobin and a white-cell count of 20,500 with 74 per cent polymorphonuclears.

On the third day a laparotomy was performed.

DIFFERENTIAL DIAGNOSIS

DR. HORATIO ROGERS: The attack eight months before entry which opens this history is suggestive of acute cholecystitis. As the story goes on, however, the patient has no more pain. Her loss of weight is not accounted for by her dietary habits because it is stated that in spite of a well-balanced diet she continued to lose weight. Her general complaint is fatigue, weakness and loss of weight, and to that we can add anemia and hypotension. Those things we are sure of.

The common causes of such symptoms and findings will have to be considered, but before doing so we might scrutinize this episode twenty months before entry, when she had an excision of what was thought to be a pigmented mole but which turned out to be a melanotic sarcoma. The surgeon was unable to do as extensive an operation as he would have liked to do, so that we are justified in supposing that she may not have been cured. Is there anything in this picture that is incompatible with that supposition? Metastases would account for her enlarged liver, which in turn might cause her high white count. Progressing sarcoma would account for fatigue, weakness, anemia and loss of weight. Her hypotension could be accounted for on the basis of metastases in the suprarenals, although it is hardly necessary to account for it specifically in a woman who is apparently so sick. We know that melanotic sarcoma is highly malignant, that it metastasizes very widely, and that it has two general methods of metastasizing, visceral and cutaneous. She obviously has no cutaneous metastases, but that does not mean she could not have visceral metastases and, if she has, they will undoubtedly be in the liver because of being blood borne rather than lymph borne. No melanin is reported in the urine, which is surprising if her viscera are full of melanotic sarcoma. If I am right it means that melanin was not looked for.

I believe that this is the best explanation of the whole picture, but in order not to leave anything out, I think we should consider some of the other causes of weakness and fatigue, loss of weight and so on.

Could she have chronic blood loss from a bleeding ulcer, perhaps accounting for her upper abdominal episode? No blood was found in the stools, or at least there is no record of it; also, I am told that with chronic blood loss her hemoglobin would be lower in proportion to her red count. She has not much anemia.

Could it be chronic sepsis from the gall bladder? She was too sick for that. Her disease has progressed far when her general health is taken into consideration, yet there are no further symptoms referable to the gall bladder.

There is no indication of liver abscess. She has had no chills and her temperature is not high. Tuberculosis and syphilis I cannot rule out, but there is nothing in particular to make us think of them here.

As regards disease of the adrenals, Addison's disease, there is no pigmentation of the skin, and we can account for her hypotension on other grounds.

If it were cancer other than melanotic sarcoma it would have to be cancer of the stomach or liver or gall bladder, either metastatic or primary. There is no reason why it could not be, but we already have an etiology for metastatic malignant disease staring us in the face which I am afraid not to use.

My diagnosis, therefore, is extensive visceral metastases from a non-cured melanotic sarcoma.

Preoperative Diagnoses

Chronic cholecystitis with cholelithiasis.
New growth?

Dr. Rogers's Diagnosis

Visceral metastases from melanotic sarcoma.

Anatomical Diagnoses

Metastasizing melanotic sarcoma, involving gall bladder, skin, intestines, spleen and both adrenals.
Melanosis of kidneys.
Bronchopneumonia.

Pathological Discussion

Dr. Tracy B. Mallory: When this patient came into the hospital the full details in regard to that mole were not known. The symptoms in the right upper quadrant were suggestive enough so that it was felt worth while to explore with the question of cholecystitis in mind. That was done and a most extraordinary gall bladder found. It was covered with black spots on its surface and contained internal, large, dangling polypoid masses, which were also black, and which one might easily imagine might have extended down into the neck of the gall bladder and produced obstruction, just as a stone might. The gall bladder was removed but any further treatment seemed pointless and she was discharged to another hospital where she remained for one or two months until death. During the terminal period she developed intractable diarrhea and eventually, many black spots in the skin. The autopsy was performed there. This is the gall bladder and even those of you who are sitting in the back of the room can see the multiple black nodules. One of the most striking features of the autopsy was the kidneys. They were almost jet-black in color and on section virtually every glomerulus contained masses of melanin. The melanin in the glomeruli seems mostly to be contained in foci of metastatic tumor, but there is also a great deal of the melanin which has been absorbed by the tubular cells. I think there is no question but that she had marked melanuria during the later stages of life that could have been found easily if it had been looked for. So far as I know, it was not. There was complete destruction of one adrenal by the tumor and metastases in the other adrenal which may or may not have had something to do with the symptoms. The entire gut was lined with hundreds of tumor nodules looking like polyposis but all consisting of melanoma. There were metastases in the spleen, which is not uncommon in sarcoma, whereas it very seldom occurs in carcinoma. The most surprising feature of the autopsy was that even with the most careful search not the minutest nodule of tumor could be found in the liver.

CASE 24242

Presentation of Case

A fifty-two-year-old, white, American physician entered the hospital with the complaint of abdominal pain, diarrhea, fever and malaise of four months' duration.

For eight or ten years he had four or five semisolid bowel movements daily, without pus or mucus in the stools, and studies had shown a "spastic colon." Eight months before entry he had an attack of acute pain centered around the umbilicus which was relieved by gr. ¼ of morphine. The attack cleared up in a day. Four months before entry he had an attack of apparent enteritis, characterized by chills, fever, diarrhea, distention of the abdomen and generalized abdominal pain. There was an epidemic of enteritis at that time in the community where he lived. The acute attack lasted for about a week, but he never fully recovered. Three months before entry his symptoms became worse, and he had acute umbilical pain and "catching" pain in the right costal margin which required gr. ½ of morphine for relief. Two days later a laparotomy was performed for removal of a ruptured appendix. The abdomen was full of serum, and the appendix was thought to be ruptured at its base. The ileum was said to be normal. He had a rather stormy con-

valescence and drained material from the wound for a month. One of two cultures of this was positive for streptococci. On the fifth postoperative day he passed five, large, soft stools which did not contain blood. He resumed ambulatory activity one month after the operation but developed mild fever and malaise which subsided on bed rest. Subsequent attempts at activity caused a return of the symptoms. Five weeks before entry to this hospital he entered another outside hospital where his white-cell count was 19,000 and a gastrointestinal x-ray series showed no intestinal obstruction. The last 20 cm. of the terminal ileum was not visualized although the barium had passed through it with ease. During the entire period after the operation the lower part of his abdomen had been distended and slightly tender, and he had attacks of gas-pain, and peristaltic rumblings and gurglings which sometimes lasted as long as an hour. He obtained no relief from his symptoms in spite of continued bed-rest and low residue diet. On several occasions his sedimentation rate and white count were elevated. About four weeks before entry he noticed in the region of the appendix scar the presence of a mass which gradually increased in size. During the few days before entry it enlarged rapidly and became somewhat tender. He had no nausea, vomiting, hematemesis or melena, but had lost about 20 lb. in weight during his illness. He had not been exposed to tuberculosis except during his professional work, but he regularly drank raw milk. He had always lived in New England and had enjoyed the best of health. He had had catarrhal jaundice at the age of twenty and for some years had had some difficulty in starting his urinary stream. His past history was otherwise negative and his family history noncontributory.

Physical examination revealed a well-developed but quite thin man who did not appear to be acutely ill. The heart and lungs were negative. The blood pressure was 95 systolic, 60 diastolic. The abdomen was slightly distended, and in the right lower quadrant, medial to a well-healed scar, there were spasm and tenderness over an easily movable mass measuring 2 by 5 cm. There was no rebound tenderness, and peristalsis was normal.

The temperature was 100.5°F., the pulse 95. The respirations were 20.

The urine examination was negative. The blood showed a red-cell count of 4,500,000 with 85 per cent hemoglobin, and a white-cell count of 9700 with 78 per cent polymorphonuclears. The stool gave a 1+ guaiac test. A barium enema passed to the cecum slowly and with much difficulty, because of nervousness of the patient. The tip of the cecum was entirely obliterated by a large mass, and the terminal ileum failed to fill. A gastrointestinal x-ray series showed a normal small intestine. The terminal ileum passed around the mass at the tip of the cecum and was probably adherent to it. There was, however, no definite evidence of intrinsic disease in the small bowel.

A laparotomy was performed on the eighth day.

Differential Diagnosis

Dr. Walter E. Garrey: This is the story of a fifty-two-year-old man who for eight or ten years had four or five semi-solid bowel movements daily. Presumably this was the normal bowel habit of a somewhat irritable colon. He had a barium enema at some time during this period. We do not know how long before so we get no help in determining when the colon last appeared entirely normal. The real difficulty began four months before entry, when he had an episode of chills, fever, diarrhea and abdominal distention. This quieted down for about a week, and again, a month after that, he had another acute episode followed by a laparotomy, during which I shall assume a ruptured appendix was found and removed. We do not know anything about the pathology of the appendix, whether there was primary appendicitis or whether it was secondarily involved in some infectious process such as might result from ulceration and perforation at the base of the cecum with periappendicitis. Presumably microscopic slides, if they were made at the other hospital, were not available here.

At no time did the patient have any blood in his stools, and while he had five, large, soft stools in one postoperative day after the appendectomy, apparently he had no further bowel trouble. Then he began to have evidence of low-grade sepsis and abdominal gurgling and pain, with slight distention; symptoms which are pretty good clinical evidence of some degree of interference with peristalsis, or a slight degree of subacute obstruction.

One point about the x-rays interests me very much, and that is whether the x-ray people thought this mass was intrinsic or extrinsic to the bowel. May we see the films, Dr. Holmes?

X-Ray Interpretation

Dr. George W. Holmes: In all the films there is definite abnormality in this region near the tip of the cecum where you see an area unfilled by the barium. Moreover, the terminal ileum is displaced upward to form a rather sharp curve in all films, no matter what position the patient is in. The tip of the cecum is never filled, but in films taken with special reference to the tip you can see the outline of it. The edges are somewhat lobulated, particularly in this one area. The question that we raised was whether the lesion was

wholly in the cecum or partly in the cecum and partly outside. In other words, did he have an abscess outside the cecum which was pressing on it and which was displacing the terminal ileum or did he have a mass in the cecum itself which extended out and perhaps involved the ileum. As far as we could make out the disease did not extend into the ileum itself. The ileum is not blocked and the mucosal pattern in the ileum appears normal, so that a condition such as ileitis or tuberculosis would be unlikely. An inflammatory mass outside the cecum might explain this part of the defect but not the whole picture. He might have a lesion in the cecum and a mass outside. We felt confident that it was not entirely due to a mass outside, and that there must be an intrinsic lesion.

Differential Diagnosis (continued)

Dr. Garrey: It certainly is fair to say that regardless of the acute episode of appendicitis with perforation, he had underlying pathology which was intrinsic in the cecum. He has evidence of three months' difficulty after appendectomy. This is compatible with a lesion producing some slight degree of obstruction in this area. The question of whether the underlying pathology in the cecum was present at the time of the appendectomy and whether necrosis in the cecum with perforation was the primary episode and the appendix secondarily involved, I do not believe I can definitely answer. But it seems as if that might have been a very likely possibility. The absence of any change in bowel habits and the frequent soft stools are sufficiently characteristic of a mass in the region of the cecum with a slight degree of intermittent obstruction.

The physical examination is of considerable interest in that it tells us that this mass was movable at the time of the patient's entry here. If that is a correct observation I think it is of importance because I do not see how an inflammatory residual mass which followed a ruptured appendix could be a movable one. The presence of a movable mass in acute appendicitis with perforation has occasionally been noted, but I do not know of any instance where it was both movable and a residual abscess. The blood count is of considerable interest in that he did not have any great degree of anemia. In summary, I believe he has intrinsic disease of the cecum, that it has been present throughout the whole illness and that it now is secondarily infected, either as a result of the appendicitis or of a perforation, and that the mass is most likely to be caused by either tuberculosis or carcinoma. Other lesions that might possibly be considered are either amebic or nonspecific granuloma of the cecum, the latter being the type which involves the small bowel and ileum, regional ileitis, or some rare tumor; but I do not see any definite evidence pointing to any of these lesions and I believe our differential diagnosis lies between tuberculosis and a scirrhous carcinoma of the cecum with, in each case, some secondary infection in or around the area. The fact that the mass is movable is in favor of tuberculosis. It seems to me that carcinoma of this long standing with resulting perforation probably would have become fixed in that time. Certainly the great majority of carcinomas of the right colon do bleed, or give some history of bleeding as evidenced in the stools or by the presence of anemia, which this man does not have. Dr. Holmes mentioned the fact that the terminal ileum was not involved and we also might say that this is against tuberculosis, the most common tuberculous lesion being an ulcerative one involving both the terminal ileum and the cecum. However, hyperplastic tuberculosis of the cecum does occur without involvement of the terminal ileum. The man certainly should have a laparotomy. It is entirely possible that the surgeon, even after opening the abdomen and inspecting the tumor, may have had difficulty in deciding between tuberculosis and cancer. My first diagnosis is tuberculosis of the cecum, with carcinoma of the cecum as a second possibility.

Clinical Discussion

Dr. Chester M. Jones: I saw this patient when he was in the hospital, and I think he illustrates a point that is important diagnostically. His history, I believe, should have given the clue to the diagnosis right from the start, had one localized his pain accurately. I went through the same line of reasoning as Dr. Garrey did. It was difficult to get a proper history, because he was a surgeon and was convinced he had appendicitis. In talking about his "appendiceal abscess" the one thing he spoke of all the time was that he had umbilical pain, and pain nowhere else. He always limited it to an area about the size of a quarter, no larger. It was a striking localization and, on the basis of that, one had to decide what kind of terminal ileal or ileocecal disease he had. That pain is not the pain of appendicitis, to my mind. The five-year story of diarrhea preceding pain interested me and on the basis of that I thought we had to consider terminal ileitis or tuberculosis. I thought that he should be explored, and that the appendicitis at best was only a coincidence in a much more generalized process. I wrote down in the record that I thought he had disease of the terminal ileum with possibly some involvement of the cecum.

Dr. Marshall K. Bartlett: When the abdo-

men was opened we found a mass in the region of the cecum. It was not adherent to the under side of the old appendix scar, but was adherent in the right gutter, and there were glands medial to the cecum which seemed to be broken down and perhaps caseous and yet the tumor itself suggested neoplasm. We were not sure of the diagnosis until we took a biopsy from one of the glands. Dr. Mallory did a frozen section on this and told us it was carcinoma. On exploration of the liver we found it was full of metastatic disease. I have never seen one more so. In view of the inflammatory condition that he had had it is interesting to know that between the first and second stages of the operation the mass became adherent to the old scar and formed an abscess which drained spontaneously. There must have been a good deal of inflammatory reaction around the tumor at the time of operation.

Preoperative Diagnosis

Abscess in the region of the terminal ileum and cecum.

Dr. Garrey's Diagnoses

Tuberculosis of the cecum.
Carcinoma of the cecum?

Anatomical Diagnosis

Adenocarcinoma, grade III, of cecum, with metastasis to regional lymph nodes.

Pathological Discussion

Dr. Tracy B. Mallory: The main tumor mass was in the cecum but it had involved the margin of the ileocecal valve, so that was unquestionably the point of obstruction and as Dr. Jones pointed out, explains the umbilical localization of the pain.

Dr. Holmes: May I call attention to the fact that the outline of this mass is lobulated on the inner surface. I think that is against tuberculosis. One should give that some weight in diagnosis. Sometimes the radiologist has an advantage over the surgeon even when he has the tumor in his hand. The radiologist is looking at the inside and the surgeon at the outside.

Dr. Garrey: Was the mass movable?

Dr. Bartlett: It was. It is interesting that he had an acute perforated appendix. I have seen one other patient who had carcinoma of the cecum and had acute appendicitis some months before. That is a fairly rare combination. There are only a half dozen cases recorded.

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THE ANNUAL MEETING

In response to the call for the annual meeting of the Massachusetts Medical Society, more than one fourth of the members registered attendance. The record shows that 1387 applied for badges. Others were also present who did not register. This large proportion of the fellows was due to the attractive programs arranged by the officers of the Society and the several committees. There were included, besides the scientific subjects selected for addresses, exhibits of educational value, arrangements for bringing together the alumni of medical schools and plans for the entertainment of non-medical groups.

Sixty doctors competed for the golf prizes and 204 ladies registered as guests of the Society.

The scientific and commercial exhibits were well arranged with qualified persons in charge. The interest shown in these displays must have pleased those who devoted so much time to preparing and arranging them.

The Section meetings were well attended. The experiment of last year of having one full day given to bringing together general practitioners and recognized authorities in the special fields of practice for the discussion of medical problems, was repeated. The large attendance apparently indicates the advisability of the continuance of this plan.

On Tuesday evening, preceding the Shattuck Lecture, Dr. Thomas Parran, Surgeon General of the United States Public Health Service, spoke of the work and aims of this department. After giving an account of the great accomplishments in the fields covered, he warned the profession that further advances in public health work will depend, to a large extent, on the loyal co-operation of physicians and all other agencies interested in promoting the health of the people of this country. Following Dr. Parran's address, Dr. David Riesman, emeritus professor of clinical medicine and professor of the history of medicine at the University of Pennsylvania School of Medicine, delivered the Shattuck Lecture, in which he gave a history of the discovery of many new diseases by the physicians of this country. This was a scholarly address made especially interesting by the speaker's ability to present the facts in an attractive setting of well-chosen phrases. All persons interested in medical history will enjoy reading the paper which will appear soon in the *Journal*.

On the evening of the second day 325 fellows and guests met for the annual banquet. The after-dinner speaker was Mr. Norman MacDonald, executive secretary of the Massachusetts Federation of Taxpayers' Associations. In selecting the speaker for this occasion the President evidently felt that the scientific programs of the meeting were so broad and inclusive that it would be well to divert attention from medical subjects to a topic of a non-medical nature, and which would be of common interest to all people of this state. The speaker presented an array of facts pertaining to taxation and the burdens imposed on the average citizen

thereby, emphasizing the danger which he believes is impending under financial and economic theories already on trial. He evidently wished to create in the minds of the intelligent portion of the population a purpose to pay more attention to the economic uncertainties that are associated with the depressions and recessions now prevailing.

The audience was very much impressed by the facts and arguments submitted.

THE COUNCIL MEETING

While the scientific programs were being carried on, the stated meeting of the Council was in session on the second day. This meeting was called to order by the President at 10:30 a. m. with 232 present. The reading of the records of the February meeting was dispensed with because of previous publication in the *Journal*.

The President presented brief biographical sketches of the lives of those councilors who had died since the last meeting and the Council rose and stood for a brief period in tribute to the memory of these departed fellows.

All the district societies were found to be represented by nominating or alternate nominating councilors and this group was directed to retire and consider names to be presented for the positions of president, vice-president, secretary, treasurer, and orator for the ensuing year. After a brief interval the report of this committee was submitted and the following designated persons were placed in nomination. For President, Channing Frothingham; for Vice-President, Albert Warren Stearns; for Secretary, Alexander Swanson Begg; for Treasurer, Charles Shorey Butler; for Orator, Elliott Proctor Joslin. No nominations coming from the floor, the Secretary was authorized and directed by vote to cast one ballot for the persons nominated. This was done and the nominees were elected.

References to the re-elected officers have been published in the *Journal* previously.

Both Dr. Stearns and Dr. Joslin have national reputations. Dr. Stearns was born in 1885 and graduated from the Tufts College Medical School in 1910 and occupies the positions of Dean and professor of psychiatry in this school.

Dr. Joslin was born in 1869 and graduated from the Harvard Medical School in 1895. For many years he has devoted a large proportion of his time to the Diabetic Clinic at the Deaconess Hospital in addition to his position of clinical professor of medicine at the Harvard Medical School.

The usual routine business relating to membership and the appointment of committees was transacted without discussion. Dr. Lund, chairman of the Committee on State and National Legislation, gave a detailed account of the work of his committee. Although disappointing in one particular this report was in the main encouraging. The opponents of sound medical education succeeded in getting the legislature to postpone the operation of the law which originally gave to the authorities power to pass on the standing of medical schools from which graduates apply for registration to practice medicine in Massachusetts. The report when published in the Proceedings of the Council will give the essential facts relating to legislation of interest to physicians.

The proposed amendment to the by-laws providing for the method by which delegates to the House of Delegates of the American Medical Association are to be elected was the subject of an animated discussion.

A majority and a minority report of the committee in charge of preparing a draft of the procedure were before the Council. A minor change in the wording of the majority report brought unanimous support. This, with all the other amendments to the by-laws (copies of which had been sent to all members of the Society), was approved by the Council and forwarded to the Society for final action.

The problems relating to prepaid hospitalization which have been studied by the Committee on Public Relations came up for discussion in an attempt to secure proper recognition of the standing of all classes of doctors in this plan for hospital service. This subject was again referred to the Committee on Public Relations for further

consideration and conference with all parties in interest.

Other subjects considered will be found in the report to be published. The work of the Council was prosecuted without undue delay and was completed soon after one o'clock when the meeting adjourned for the Cotting Luncheon.

After the completion of the Section meetings at noon of the third day the Annual Meeting of the Society was called to order by the President.

The Secretary reported the number of admissions to the Society for the year. These exceeded the number removed from the membership list by 122, bringing the number of members now enrolled to 5298.

Resolutions were submitted from the floor emphasizing and endorsing the action of the Council Meeting in February relating to the reappointment of Dr. Henry D. Chadwick to the position of Commissioner of Public Health. These resolutions were unanimously approved and have been forwarded to His Excellency Governor Hurley and the Governor's Council.

The several amendments to the by-laws which were forwarded by the Council were adopted by the Society. Copies of these amendments had been sent to all fellows of the Society.

The sentiments of regret at the retirement of Dr. David Cheever, chairman of the Committee on Ethics and Discipline, Dr. David Blakely, chairman of the Committee on Membership and Finance and Dr. Arthur Marsh of the Committee on State and National Legislation as expressed by the President were endorsed by the Society. These three fellows have served the Society for many years with fidelity and devotion to the duties of the several positions occupied.

In his annual address the President reported that the financial condition of the Society is sound, due to the conservative administrations of the Committee on Finance and the Treasurer. References to controversies existing in organized medical bodies, the survey of the inadequacies of medical care, hospital service and other important matters before the profession showed his full understanding of the need for careful attention devoid of prejudice and ill-feeling.

The last official act of the Society was to listen to the Orator, Dr. Allen G. Rice, of Springfield. He discussed the surgical practice of former years as compared with that of the present, paying tribute to the quality of those who worked more or less single-handed and had to depend on sound thinking, manual dexterity and experience rather than the equipment of modern clinics for their success. This paper[1] will be enjoyed by all who will read it.

So far as this brief and sketchy reference to the successful meeting is concerned it is intended simply to arouse such interest as will lead to a careful examination of the reports of the Proceedings and the reading of the papers presented before the Sections.

Although the President expressed appreciation of the work done by the several committees no one other than those engaged in planning and carrying on the details of the many activities can realize the time and energy expended. Their best thanks will be found in the good attendance, the general pleasure expressed with the arrangements and service and the disappointment of the fellows who were unable to attend.

REFERENCE

1. Rice, A. G.: The passing of surgical yeomen. New Eng. J. Med. 218:905-911, 1938.

DR. SIGMUND FREUD

MANY physicians are watching Vienna with interest as news comes of what is happening in that medical center. Of special interest is the fate of Dr. Sigmund Freud.

Freud started his medical career in the field of medical investigation, not of psychotherapy. But from the beginning the leading trend of his future work was revealed: to consider insight and knowledge as the way to help and cure.

His first interest was given to physiology. One of his publications, a monograph on the effects of the coca plant, the medicinal use of which was unknown at this time, gave the cue for the discovery of cocaine as a local anesthetic. Later he turned to the anatomy and pathology of the brain, and this line of research brought him for the

first time face to face with the problem of psychoneurosis.

This was the period — the eighties of the last century — when medicine with the help of many great discoveries had definitely established itself on a scientific basis. Yet the study of psychoneuroses and psychoses, due to their inaccessibility by the new methods and instruments, was still in the stage of a crude empiricism. They represented a dark corner which few cared to investigate, since there were so many important and fascinating discoveries to be made by studying organic processes with the help of the test tube and the microscope.

Charcot represented the most important exception. He had studied intensely the symptomatology of hysteria and furthermore had demonstrated that the phenomena of hypnotism, which hitherto had been regarded as sheer humbug, were real and deserved serious attention. To Charcot, then, Freud went and became his disciple at the famous clinic of the Salpetrière in Paris and later on studied under Bernheim and Liébault. But the turning point in his career did not come until he learned that hypnosis could be used not only to give commands, which by reasons unknown were obeyed by the hypnotized patient, but also for the exploration of an otherwise hidden part of the mind.

This new knowledge came to him through Breuer, an eminent physician in Vienna, who had, somewhat by accident, discovered that a hysterical patient of his was able during her hypnotic state to tell him the meaning and origin of her symptoms; by revealing these secrets she had step by step got rid of her symptoms. On the basis of this and some similar experience a "cathartic" method was evolved. The joint work of Breuer and Freud was published under the title *Studies in Hysteria.*

Neither the first incomplete theory nor the mysterious and undependable technic of hypnotism was satisfactory to Freud. He then went on the lonely way of original and independent research. It led him to the dropping of hypnosis and replacing it by the more difficult and complicated but far more adequate technic of "free associations." The importance of the "unconscious" for psychopathology, the dynamism of repression and the influence of infantile sexuality were thus brought to light.

We can distinguish three periods in Freud's lifework. In the first he developed and formulated his fundamental theories, explored the unconscious and demonstrated the role which it plays not only in psychoneurosis and psychosis but also in phenomena of pathologic character that yet belong to the working of the normal mind, such as the dream, and the so-called "psychopathology of everyday life." The crowning piece of this period is the *Interpretation of Dreams* which was published five years after its completion, when every part of it had stood the test of experience.

In the next period Freud showed in different ways the fertility and also the revolutionizing influence of the new science; these were not limited to the field of psychopathology. In a series of detailed case histories he demonstrated the mechanism of the struggle between instinct and repression, and the way in which the various forms and stages of this struggle produce the different forms of hysteria, obsessional neurosis, schizophrenia and paranoia. On the other hand he turned his attention to the social side of the mind and studied esthetic sociologic and ethnologic problems from a new angle, namely from the point of view how much the beliefs, mass phantasies and institutions which man has evolved and accumulated in the course of the many centuries of his cultural development have been stimulated and influenced by unconscious tendencies and conflicts. The two representative works of this period are the *Introductory Lectures* and *Totem and Tabu.*

The third period is characterized by a still more and more widening concept of psychoanalysis. Without neglecting its clinical aspects Freud lifted it to a new level; the interest was not any longer narrowed down to the unconscious, but comprehended also the structure of the "ego." What had been an approach to certain problems of

psychology from the side of psychopathology became the beginning of a new psychology. In *Beyond the Pleasure Principle* the attempt was made to link up the laws ruling the human mind, especially its instinctual processes, with the principles of biology. In a series of books Freud probed the value and the function of the most important cultural achievements. *Civilization and Its Discontent* is the most remarkable of these works which — although Freud himself would protest against such a designation — must be termed deeply philosophic.

As shown even in this short sketch, Freud's interests and knowledge are widespread, comprising an astounding number of subjects. Besides his great contribution to psychiatry, besides his practical therapeutic work to which he devoted nine hours daily he found time to study many other scientific disciplines which he used for his work, and to know and enjoy the masterpieces of literature of the past as well as of his own day. Not satisfied with all that, he studied with special interest the history and civilization of old Egypt and made collecting its antiquities his hobby.

Freud has always led a quiet and retired life, given up entirely to his scientific and scholarly pursuits, far away from the strife of politics. While his ideas were heatedly discussed all over the world, while his name became a byword of reproach, he avoided all controversy and resisted every effort to let himself be drawn into the limelight of publicity. He has been continually surrounded by the love of his family — he had six children, of whom the youngest, Anna, became associated with his work — and the devotion of his nearest disciples to whom he has shown an unflinching loyalty. Outside of this circle he has but few friends, but among them are men like Thomas Mann and Romain Rolland.

He had lived in Vienna since early youth, inhabiting for nearly half a century the same rooms. Now, on the eve of his eighty-third year, he has had to leave his old home in search of a new country. We believe that he will take with him his unexhausted vitality and his unbroken strength of mind.

MASSACHUSETTS MEDICAL SOCIETY

SECTION OF OBSTETRICS AND GYNECOLOGY

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CASE HISTORY NO. 76. BLEEDING AT SEVEN MONTHS, RUPTURE OF THE UTERUS

Mrs. G. S., a white multipara, para six, aged thirty-seven, was first seen when she visited the prenatal clinic on October 20, 1937. She had been referred by a Community Health nurse who reported a trace of albumin in the urine.

Her family and past histories were negative. Catamenia began at fourteen, were never regular, frequently occurring as often as fifteen but never going over twenty-eight days, and lasting four days with no unusual discomfort. Her last period was July 28, making the expected date of confinement May 4. In 1923 she was delivered of a full-term, 7 lb. child, which is living, and in 1926 she had a living child by cesarean section at term. Other cesareans were done in 1924, 1927, and 1935, all at six months because of toxemia.

The patient weighed 224¼ lb. Her teeth were in fair condition, her thyroid showed no enlargement, and there was no general glandular enlargement. The heart was normal in rate and rhythm. The lungs were clear and breath sounds were normal. The blood pressure was 158 systolic and 124 diastolic. The abdomen was fat and showed four separate scars extending from the symphysis pubis to the umbilicus or above. There was diffuse weakness in the region of the lower end of these scars. The abdomen showed no masses or tenderness. Vaginal examination showed the uterus to be about the size of a three-months' pregnancy. It could not, however, be felt through the abdomen. A voided specimen secured at this time showed a trace of albumin but nothing abnormal otherwise.

The patient was seen in the prenatal clinic six times and after the first visit presented a similar picture on each occasion. She had no complaints. Her weight was increasing gradually, her blood pressure had come down to within normal limits without treatment and was recorded as averaging 110 systolic and 60 diastolic. She showed no toxic symptoms and was reported to be in good condition. The urine examination on each of these occasions showed a trace of albumin, but these were

A series of selected case histories by members of the section will be published weekly.
Comments and questions by subscribers are solicited and will be discussed by members of the section.

in every instance voided specimens. No other abnormal findings are recorded.

On March 4, when about thirty-two weeks pregnant, the patient commenced to have some nausea and moderately severe pain in the lower abdomen. She described this latter as radiating toward both lower quadrants. Thinking that this was indigestion she took some baking soda, and after that vomited twice. During this time she also commenced to have a pain in the lower back. She arrived at the hospital at 9:30 complaining of abdominal pain which was mostly in the right-lower quadrant. Because of her obesity the uterus was difficult to outline with any precision and no other structures could be felt in the abdomen. There was definite tenderness which was apparently located in the left side of the uterus. Shortly after admission to the hospital she vomited again. A catheter specimen of urine showed a large trace of albumin. Her blood pressure was 108 systolic and 70 diastolic, her pulse was 80, her temperature 98°F., and respiration 16. A white count was 16,600 and her hemoglobin was 74 per cent Sahli. Examination of the blood showed a nonprotein nitrogen of 35 mg., a uric acid of 4.2 mg. per cent, chlorides of 270 mg. per cent and a carbon-dioxide combining power of 36 per cent. Rectal examination produced moderate discomfort but no acute pain. There was no presenting part in the pelvis.

Shortly after admission to the hospital the patient began to pass a small amount of bright-red blood by vagina. The attending physician saw her shortly after 11 o'clock at which time her blood pressure and pulse rate were about as on admission, but the abdominal tenderness was definitely increasing and included both sides of the uterus. It was thought at this time that she had had a premature separation of the placenta because of the abdominal findings, the trace of albumin in the urine, her history of repeated toxemias and the small amount of bleeding which she had had. In view of her repeated cesarean sections, it was decided to do another at once. During the preparation of the operating room the patient collapsed. Her blood pressure fell to 70 systolic, and she became pulseless. It was then obvious that she was bleeding severely and that she had probably ruptured her uterus.

The patient was anesthetized with cyclopropane. The abdomen was prepared with ether and half-strength iodine, and a median incision was made. On coming down to the peritoneum there was the bluish appearance characteristic of blood in the abdominal cavity. On opening the abdomen a large quantity of fresh and old blood was found. The uterus had ruptured, the placenta was completely detached, and the membranes were bulging through the rupture. No attempt was made to deliver the sac in toto, but the fetus, placenta and membranes were removed as quickly as possible and the abdominal cavity sponged free of blood. It was then found that the uterus was well contracted but showed a rupture running from the fundus down to the lower uterine segment. There were so many lateral adhesions to the uterus from the preceding operations that it was thought unwise to attempt hysterectomy. The uterus was closed with a continuous suture of No. 2 chromic catgut. This controlled the bleeding very well. A second layer of continuous No. 2 chromic catgut was inserted on the serous surface. The patient was then sterilized by the Madelener method. The abdomen was closed in layers in the usual manner, and stay sutures of heavy silk were inserted.

During the operation attempts had been made to give the patient intravenous glucose solution, but these were unsuccessful because the veins were collapsed. At the close of the operation an arm vein was exposed and a cannula inserted. Ten per cent intravenous glucose was started and the patient's condition commenced to improve at once. Her husband and a brother had been typed for transfusion but were incompatible and a transfusion of 500 cc. of citrated blood from a professional donor was given shortly after the intravenous saline. This improved the patient's condition still further, and she was returned to bed in moderately good condition. There she was placed in medium Fowler's position and oxygen was started through an intranasal tube because of the reduced oxygen-carrying power of her blood.

Her highest temperature was 101.2°F., March 5, with a pulse rate of 120 and respirations of 48. The patient showed some cyanosis when the oxygen was discontinued. An x-ray plate of her chest, taken in bed, showed involvement of the upper lobe of the right lung. This was diagnosed as early pneumonia. She was more comfortable with the nasal oxygen than without it. The abdomen showed no distention and no tenderness except in the midline at the site of the incision. She was given 1000 cc. more of 10 per cent glucose solution intravenously and a second transfusion of 500 cc. of citrated blood. Her hemoglobin before the second transfusion was 67 per cent and the red count was 2,850,000.

On March 6, her highest temperature was 101.4°F., her pulse rate 108, with a drop in respiration to 32. Her blood pressure at that time had come up to 118 systolic and 68 diastolic. The patient was taking fluids by mouth and there was no nausea or vomiting. Her breathing was

much easier and her color was better than on the previous day. The abdomen showed no tenderness or spasm and very little distention. An effort had been made to secure sputum for pneumococcus typing, but the only specimen obtained was small and blood-streaked and might well have come from around the tube in the nasopharynx. A blood count showed 10,000 white cells, and 3,410,000 red cells.

On March 7, the pulse, temperature and respirations were about as before. Her general condition continued good and she commenced to pass gas by rectum. She was taking a soft-solid diet. This continued until March 10 at which time a second x-ray of her chest showed considerable improvement in her lung condition. On March 13 her temperature had dropped to 99.6°F., her pulse rate to 96 and her respirations to 20. Her bowels were moving and she was on a full diet.

From March 13 to 16 her evening temperature averaged 100°F. During this period her pulse rate was continuously between 80 and 90 and her respirations averaged 20. When the dressing was done on March 16 the abdominal incision was found to be clean and healing well. The skin sutures and stay sutures were removed at that time.

On March 19 the patient was allowed to put her feet out of bed and on the following day she was allowed to sit up in a chair. On March 23 she was discharged from the hospital. At the time of discharge the abdominal wound was dry, clean and well healed. There was no abdominal tenderness. On bimanual examination there was no pelvic tenderness and the uterus was well involuted. The cervix was posterior and its mobility was limited. The vaults were clear. Because of the fact that the patient had shown a large trace of albumin in every specimen of urine examined since her delivery and because the sediments had shown leukocytes ranging from 2 to 18 per high-power field, she was discharged to the medical clinic for follow-up work on her kidney condition. At the time of discharge her blood pressure was 112 systolic and 72 diastolic, while her blood count showed 11,400 white and 4,720,000 red cells, with a hemoglobin of 81 per cent (Sahli).

Comment. The commonest site of rupture of the pregnant uterus is through the scar of a previous cesarean section. This is one of the reasons why an initial cesarean should be undertaken only after serious thought. It is a rule in many hospitals that no cesarean section shall be performed without consultation. This consultation, of course, should be held with an obstetrician. Spontaneous rupture of the pregnant uterus does occur even though not associated with the scar of a previous cesarean section, but these ruptures always take place during active labor. While it is perfectly possible to have a complete separation of the placenta at seven months without previous pathology, the fact that this patient had had four previous cesareans should have been sufficient reason for the obstetrician in charge to have made the correct diagnosis long before the patient was in extremis and before the abdomen was opened. The decision not to take this uterus out in this particular case was probably a very wise one and sterilization certainly was indicated and justifiable.

INFANTILE SCURVY

Although the first description of scurvy as a disease appeared in 1260, it was not until 1668 that it was definitely described as occurring among infants. This disease, which results from a deficiency in vitamin C and is characterized by generalized bleeding, does not, under ordinary circumstances, occur in normal breast-fed babies provided the diet of the mother contains enough vitamin C. However, should the mother's diet be poor, her milk will not contain the necessary amount of this vitamin and as a result the baby will develop the disease. It is for this reason that doctors often add some substance containing vitamin C, such as orange juice or tomato juice, to the diet of the nursing infant. Although the introduction of pasteurized and boiled milk as a precaution against the development of such milk-borne infections as tuberculosis and typhoid fever undoubtedly removed these dangers from the infant, it was followed by an increase in the incidence of scurvy as heating destroys vitamin C. Therefore, it is important that some substance containing this vitamin should be added to the diet of the artificially fed infant. Since boiling or prolonged heating destroys the vitamin, it naturally follows that orange juice should be neither boiled nor heated, nor should boiling water be added to the juice. The young mother who has been taught that milk, water, bottles, nipples, and so forth, must all be sterilized may easily assume that orange juice should be heated or boiled and as a result the vitamin content is destroyed and the baby develops scurvy.

Age is a definite factor in the occurrence of scurvy; the majority of cases develop during the latter half of the first year and the first half of the second year of life. After the age of one year, scurvy becomes increasingly less common, for at this period the infant's diet usually includes various foods which contain vitamin C. Season also tends to exert some influence on its occurrence; it is more frequently encountered during the winter and spring months when the herds may not be receiving fresh fodder, thereby reducing the vitamin content of the milk.

In the majority of instances the symptoms of scurvy do not appear suddenly but gradually develop over a period of several weeks until finally the typical signs of the disease are present. Early in the course of the disease the infant becomes fretful, irritable and pale, and does not like to be moved. This irritability is often first observed when the lower extremities are being handled and is due to pain resulting from bleeding beneath the outside covering of

A "Green Lights to Health" broadcast given by Dr. R. Cannon Eley on Wednesday, May 25, and sponsored by the Public Education Committee of the Massachusetts Medical Society and the Massachusetts Department of Public Health.

the bones. Any movement produces this pain, which may become so severe that the baby will begin to scream and cry from fear when anyone comes near it. This tendency to bleed is usually more likely to occur about the joints, such as the knees and ankles, than along the shaft of the bone and may cause the joint to become three or four times its normal size. In severe cases, these hemorrhages often cause the growing end of the bone to become separated from the shaft thus retarding the process of normal growth. As a result of the painful joints, the infant takes a rather characteristic frog-like position, lying motionless, flat on its back, with the thighs drawn upward, the knees bent and the legs turned outward at the hips. The gums are red, swollen, bleeding and extremely painful making it increasingly difficult for the baby to nurse, and if the teeth have been cut, dark hemorrhagic blisters or areas may appear at the point where the teeth come through the gums. Bleeding behind the eyes or around the eye socket is frequently seen and may not only cause the eye to protrude but may also give it the appearance of the well-known "black-eye." There are often many "black and blue" spots on the body suggesting that the infant has met with some fall or accident, and in some instances blood may appear in the urine and in the stools. As one might expect, these changes are accompanied by fever, which is often as high as 102 or 103°F., elevation in blood pressure and a more rapid pulse rate. However, in view of the fact that the present-day infants' diet is more liberal than those formerly employed, few babies suffer from complete lack of vitamin C and the more severe and advanced forms of the disease are, therefore, less frequently seen today than they were several years ago.

The diagnosis of scurvy seldom presents any great difficulty: the story of a diet inadequate in its vitamin C content and the general appearance of the baby suggest the possible presence of the disease. Even if the signs and symptoms of the well-advanced case are not present, one may employ suitable x-ray and laboratory studies which will settle the diagnosis. It is well known that an x-ray examination will show early changes in the bones that cannot be detected by the usual physical examination. Recently, chemical tests have been so perfected that the exact amount of vitamin C within the blood and the urine can be estimated, thus making it possible to discover that a baby is developing the disease long before any physical signs or symptoms are present.

Scurvy can be prevented more easily than it can be cured. Therefore, in considering its treatment we should first consider its prevention. Every infant who is fed upon boiled, pasteurized, evaporated or dried milk should also receive some substance containing vitamin C, as early as the first or second month of life. Even if the baby is nursed and the mother is receiving an adequate diet, the addition of this vitamin as a precautionary measure is worth while. Orange juice is probably the most convenient source of vitamin C and should be given in increasing amounts until the baby is taking approximately 2 oz. each day. Tomato juice offers another good source but when used should be given in amounts twice that of orange juice. Lemon or grapefruit juices may also be given but, due to their taste, are less readily taken by the baby. There are, however, some infants who refuse to take either orange or tomato juice and another group who develop rashes or other skin troubles after taking them. What can be done to prevent scurvy from developing among this group of babies? Within the past two years, vitamin C has been separated in its pure form and may be obtained from pharmaceutical houses in the form of a pill, each pill containing 25 mg., or the same amount of the vitamin C as that present in one large or two small oranges. One of these tablets given each day to the baby will prevent scurvy. Furthermore, the price is often less than that of fresh fruit so there is really no excuse for the presence of scurvy from a financial viewpoint.

The treatment of the disease is usually simple and effective, only requiring the administration of an adequate amount of vitamin C to the baby. However, in severe cases, care should be exercised not to give too large amounts as there is reason to believe that excessive quantities may not always prove to be without danger. The results of this treatment are not only prompt but almost spectacular: within twenty-four hours the disposition improves, the tenderness begins to disappear, joint enlargements go down, gums stop bleeding and appetite improves. However, in severe and advanced cases with poor nutrition, or in cases with other diseases such as pneumonia, death rather than recovery may be the result. Scurvy is a preventable disease. Why let it occur?

Q. What is the best way of preventing scurvy?

A. The best means of preventing scurvy is by education of the public to the importance and significance of vitamin C in the infants' diet. This antiscorbutic substance is not present in pasteurized, boiled or dried milk, so it should be added to the food in some suitable form, such as orange juice or tomato juice. Recently this vitamin has been prepared commercially in the form of a tablet which is not expensive and which can be given to those infants who refuse or cannot tolerate fruit juices containing vitamin C.

Q. Are scurvy and rickets due to the same vitamin deficiency?

A. No. Rickets results from a deficiency in vitamin D which is present in cod-liver oil; scurvy results from a deficiency in vitamin C. However, it is not uncommon to see a baby suffering from the two diseases at the same time, for a diet that is deficient in one vitamin is often deficient in others. This is clearly shown by the fact that in a series of 314 babies with scurvy 36 were also suffering from active rickets.

Q. Is scurvy primarily a disease of the poor?

A. Scurvy may occur among the rich as well as the poor if the vitamin C requirements are inadequate.

Q. Is scurvy considered a common disease?

A. The series of 314 cases, previously mentioned, was seen and treated at the Infants' and Children's hospitals in Boston from 1926 through 1935.

Q. Did all the babies recover?

A. No. Three died from pneumonia and one died from tuberculosis.

Q. At what age is the disease most likely to develop?

A. As our statistics showed, 276 of the patients were from six to twelve months of age.

Q. What was the most common symptom of the babies studied in the review?

A. The majority of the babies were suffering from well-advanced scurvy, and the chief disturbance was pain when the babies' legs were even gently moved.

Q. Do the hospital records show that there is as much scurvy today as there was ten years ago?

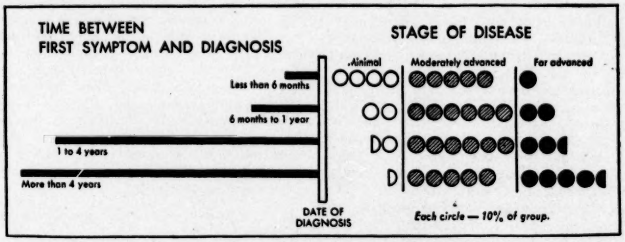
A. In 1926, there were 32 cases; in 1935 there were 38 cases. These figures seem to show that there was very little, if any, change in the amount of scurvy during the ten-year period. This can only be due to improper feeding of children, for we know what causes the disease and we know how to prevent it as well as how to cure it.

MISCELLANY

EARLY DIAGNOSIS OF TUBERCULOSIS

One measure of the efficiency of the tuberculosis campaign is the percentage of tuberculosis patients who reach the sanatorium in the minimal stage. The most extensive study yet made indicates that only about 16 per cent of sanatorium admissions are classified as minimal cases. There are several reasons why this number is so small. Two of them, namely delay in seeking advice and delay in making the diagnosis after the patient has visited the doctor, have been analyzed by Monte and Blitz (New Orleans M. & S. J. *90:* 468-475, 1938) who reviewed the experiences of 300 patients under treatment in the Dibert Memorial of Charity Hospital in New Orleans.

Of the 300 white adult patients studied, less than 2 per cent were classified as in the minimal stage, 45 per cent in the moderately advanced and 53.3 per cent in the far-advanced stage. Ages ranged from sixteen to seventy-eight years. Seventy-six per cent of the women and 51 per cent of the men were under thirty-five years of age.



This chart is based on a study of the experience of 361 patients with tuberculosis, made by Ruth A. Sedar, Social Research Series No. 5, National Tuberculosis Association.

A history of tuberculosis in the immediate family was found in 28 per cent of the series. A striking feature was that almost twice as many women as men admitted a history of tuberculosis in the family. Evidently contact with the tuberculous patient in the home is more frequent among female members of the household for they usually have the responsibility of caring for and nursing the sick.

Prior to their admission to the hospital, the diagnosis was established in 61.6 per cent of the cases, was suspected in 19.6 per cent and was not made in 18.6 per cent. The high incidence of "suspected" cases is accounted for by the limited facilities of the average practitioner in Louisiana, and the authors believe that if the roentgen ray and laboratory aids were more widely used, diagnosis would be established in a greater percentage of cases.

The responsibility for delay in diagnosis when symptoms are present must be shared alike by the patient and the attending physician. Symptoms of a mild nature often seem negligible in the patient's estimation and thus he postpones medical consultation until more severe symptoms appear. In 2 of the 300 patients, the duration of symptoms before visiting the doctor averaged two months, and two more months elapsed before the diagnosis was established. At the end of the scale are 90 patients who delayed almost ten months before consulting the doctor and then suffered a further delay of about twelve months before the diagnosis was established.

Cough and expectoration were the most prominent initial symptoms, and these also most frequently caused the patient to seek medical attention. In over 50 per cent of the cases, this symptom complex, although being the incentive for the visit, had been present for many months and undoubtedly was associated with constitutional symptoms of some degree. Yet these patients insisted that the accompanying symptoms were of little consequence and were not serious enough to interfere with their daily routine. True, lesions may be present in the lung parenchyma without any obvious symptoms as revealed in 5 cases reported wherein symptoms of subjective importance were absent, while roentgenological study revealed active pulmonary tuberculosis. Four of these cases were minimal, the fifth being moderately advanced. This does not necessarily imply that the number and duration of symptoms can be strictly correlated with the stage of the disease, for some of the patients volunteered the information that hemoptysis or pleurisy had been the initial symptom, and immediate skiagrams revealed either moderately or far-advanced pulmonary tuberculosis.

Of all the symptoms listed, there is little variation between the initial and presenting symptoms, with the exception of hemoptysis. As an initial symptom it was present in 9.6 per cent of the cases, whereas 22.7 per cent sought medical aid because of blood spitting. This difference in percentage indicated that although these patients had had previous symptoms a pulmonary hemorrhage was regarded with enough fear to prompt them to visit a physician.

Fever and night sweats, a combination of symptoms which in most textbooks is given a ranking position in the diagnosis of tuberculosis, were found with comparative infrequency in this series. As initial symptoms they were present in only 3.6 per cent, and as presenting symptoms, in 5 per cent of the cases.

The authors offer the following explanations for the failure in diagnosis on the basis of presenting symptoms:

Cough and Expectoration. The diagnosis was not suspected in 38.3 per cent of this group. This was probably due to the tendency on the part of physicians to diagnose prolonged or recurrent coughs as chronic bronchitis or chronic sinusitis.

Loss of Weight and Fatigability. Tuberculosis was not suspected in 50 per cent of these cases. Such diagnoses as nervousness, nervous breakdown, overwork, overindulgence in alcoholics and tobacco, dissipation, and chronic debilitating diseases were offered by the attending physician.

Hemoptysis. "Blood spitting," which has been known throughout the centuries as one of the pathognomonic symptoms of phthisis, was a frequent source of error in

diagnosis. Although the percentage of failure (22.1) was less than that in other groups of symptoms, it is still too high. The absence of positive physical findings on examination of the chest probably accounts for such diagnoses as ruptured blood vessel, irritation of throat, and bleeding from nasopharynx.

Pleurisy. When a patient is seen only once, it is difficult to make a diagnosis unless a suspicion of tuberculosis is ever present in the physician's mind and the patient is urged to return for further observation after the acute attack subsides. Idiopathic pleuritis, though it may be accepted by the majority of physicians, should never be used as such until a sufficient interval has elapsed and the lung has remained clinically and radiologically negative. Failure to recognize this has resulted in 40.9 per cent mistaken diagnoses.

Fever and Night Sweats. Climatic and endemic conditions undoubtedly are the source of confusion as regards this symptom complex. With the high incidence of malarial infection in Louisiana, it is little wonder that a number of patients were treated previously with quinine, plasmochin or Atebrine. This group leads all others in percentage of error, 73.3 per cent being neither diagnosed nor suspected.

Grippe. The diagnosis was missed in 40 per cent of the group presenting symptoms ordinarily attributed to an acute respiratory infection with or without physical signs of a pneumonitis. The constant occurrence of "flu" epidemics and the failure to realize that bed-rest over a short period may render a tuberculous patient asymptomatic are the natural sources of error. As in any of the aforementioned symptom complexes, suspicion of tuberculosis is of prime importance. — *Tuberculosis Abstracts,* June, 1938.

RÉSUMÉ OF COMMUNICABLE DISEASES IN MASSACHUSETTS FOR MAY, 1938

DISEASES	MAY 1938	MAY 1937	FIVE-YEAR AVERAGE*
Anterior poliomyelitis	0	1	6
Chickenpox	1129	1579	1134
Diphtheria	8	21	43
Dog bite	1107	1223	1066
German measles	74	259	2269
Gonorrhea	366	486	488
Lobar pneumonia	475	434	380
Measles	1350	2953	3800
Meningococcus meningitis	4	31	15
Mumps	977	747	953
Paratyphoid B	20	81	17
Scarlet fever	1525	976	1081
Syphilis	507	534	441
Tuberculosis, pulmonary	178	267	324
Tuberculosis, other forms	13	20	39
Typhoid fever	1	4	10
Undulant fever	2	1	3
Whooping cough	478	1220	817

*Based on figures for preceding five years.

RARE DISEASES

Diphtheria was reported from: Boston, 2; Lexington, 1; Salem, 2; Watertown, 1; Worcester, 2; total, 8.

Dysentery, bacillary, was reported from: Cambridge, 1; Danvers, 9; Springfield, 4; Wellesley, 1; Woburn, 5; total, 20.

Meningococcus meningitis was reported from: Boston, 1; Haverhill, 1; Quincy, 1; Worcester, 1; total, 4.

Paratyphoid B was reported from: Brookline, 9; Braintree, 1; Fall River, 8; Newton, 1; Sharon, 1; total, 20.

Pfeiffer bacillus meningitis was reported from: Beverly, 1; Gardner, 1; Worcester, 1; total, 3.

Septic sore throat was reported from: Amherst, 2; Beverly, 3; Boston, 8; Cambridge, 1; Everett, 1; Greenfield, 1; Salem, 3; Southbridge, 1; Sturbridge, 1; Wakefield, 1; total, 22.

Trichinosis was reported from Springfield, 1.

Typhoid fever was reported from Boston, 1.

Undulant fever was reported from: East Bridgewater, 1; Millis, 1; total, 2.

Diphtheria was reported at a record low figure.

Scarlet fever, mumps and lobar pneumonia were reported above the five-year average.

The reported incidence of tuberculosis (other forms) showed record low figures both for this and any other month ever recorded.

The reported incidence of German measles showed record low figures.

Chickenpox, whooping cough and measles were reported below the five-year average.

Except for May, 1934, which was equalled, meningococcus meningitis showed record low incidence.

The incidence of undulant fever was not remarkable.

The figures for pulmonary tuberculosis showed record low incidence.

Paratyphoid B fever continued to be reported at a high figure.

Typhoid fever showed record low incidence.

The reported incidence of dog bite was maintained at a fairly high figure. Several cases of animal rabies were reported throughout the state. Previously reported foci in Westborough, Malden, Sutton and Andover were active. A new focus was noted in Grafton.

CORRESPONDENCE

HOW DeQUINCEY BECAME AN OPIUM ADDICT

Among the books on DeQuincey none is more interesting than the biography by Horace Ainsworth Eaton (Oxford University Press, 1936).

Eaton tells us that in 1804 DeQuincey came up to London, from Worcester College, Oxford. He took lodgings, and for some reason not explained, omitted the complete washing of his head in cold water, which he was accustomed to take. He was suddenly seized with a most violent toothache, which he attributed to this omission. "He jumped out of bed and plunged his head in a basin of cold water, and with hair thus wetted went to sleep." The next morning he suffered the most excruciating facial neuralgia, we are told, which kept up for three weeks. Nearly frantic with the pain he walked out one day and met a college acquaintance. DeQuincey told him of his constant misery and the student recommended that DeQuincey take opium for the pain. Near the Pantheon he found a druggist, who gave him some laudanum, with directions how to take it. DeQuincey stated in the *Confessions,* that in all his wanderings about London he was never able to find the same druggist again. In an hour there was marvelous relief from the pain, and later a stage of both mental and physical stimulation became apparent. After a time, DeQuincey was accustomed to call for "a glass of laudanum negus, warm, without sugar" every day. He took laudanum eight years continuously. We are told that "from his own account he arose to the astonishing amount of 8000 drops of laudanum, or about 7 wine glasses." After a time he was able to reduce to 1000 drops a day.

WILLIAM PEARCE COUES, M.D.

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Brookline, Massachusetts.

REPORTS OF MEETINGS

HARVARD MEDICAL SOCIETY

A meeting of the Harvard Medical Society was held at the Peter Bent Brigham Hospital on March 27. Dr. C. Guy Lane presided.

The first case presented was that of a forty-seven-year-old Swedish woman, who entered complaining of pain and a lump in the left axilla of two months' duration. Three months before entry a small skin lesion had developed on the left index finger. This had been followed a week later by lymphangitis, and a month before entry, red, tender papules came out on both forearms. These continued to appear, and each lesion lasted about three weeks. Coincidentally a lump appeared in the left axilla. Five days before entry, burning of both eyes with photophobia was noticed. Physical examination showed injection of the conjunctivae and considerable lacrimation. There was a lemon-sized, soft, slightly tender mass in the left axilla, which was fixed to the skin. Ten to fifteen, round, erythematous purplish papules were seen on both forearms, chiefly on the dorsal aspect. The routine laboratory examinations were negative except that a blood Hinton test was positive. The case was presented as an example of erythema multiforme.

The second case was that of a seventeen-year-old salesgirl, who had presented ulcers on the lower legs for the past four years. These recurred each winter after the first snow and always healed in the summer, leaving round pigmented areas. The physical examination was negative except for punched-out ulcers about 1 cm. in diameter. There was some surrounding induration and a diffuse brownish-red pigmentation of the legs and scars of previous ulcers. The laboratory work was negative. The skin temperature readings were considerably increased during spinal anesthesia. Normally her feet were very cold. Dr. John Homans discussed this patient and considered her as a probable example of erythema induratum. He has treated such cases by sympathectomy, with good results. The question arose as to whether the temperature of the lower extremities would be permanently elevated by such measures. Dr. Homans reported that the ulcers always healed after this procedure. Dr. Lane discussed the important features of erythema induratum.

Dr. Edward A. Edwards spoke on "The Pigments and Color of Living Human Skin." Not only is the normal eye incapable of accurate color judgment, but in addition, 4 per cent of the population are color blind, and 30 per cent subaverage in their response to color. In many disease states it is desirable to have an objective record of the skin color. The data for this specification can be obtained instrumentally by the Hardy recording spectrophotometer. This instrument measures the reflection of light at each wave length of the visible spectrum. Not only does the curve obtained give bases for color specification, but also, by observing the absorption bands present, one can identify the factors responsible for skin color.

Five pigments and one additional optical effect were found to give skin its color. The pigments are *melanin; melanoid,* a derivative of melanin; *oxyhemoglobin; reduced hemoglobin;* and *carotene.* The turbidity of the deeper portions of the epidermis adds a blue component to the reflected light through the optical process called *scattering.* These factors were studied in the curves obtained from normal adult subjects in the hope that this would form a basis for future work in disease.

Melanin is present in granules in the deep layers of the epidermis. They are fewest in blond Whites, increasing in brunettes, and present in large amounts only in the skin of dark races. Melanin was extracted from the skin of a Negro and transmission curves were made of this substance in varying concentration. As the concentration varies, the color changes from a brown to a yellow, and finally to an orange red. This corresponds to color changes seen in the various races. Except for melanin formation, which is induced by exposure to sunlight, it follows a very definite pattern, which was shown in chart form. It is richest in the skin of the scrotum and areolae mammae, fairly rich in that of the axilla and perineum, and only slight in amount in that of the palms, soles, breasts and buttocks. It is low in the skin of the trunk, increasing dorsally from the scapular to the lumbar regions.

Melanin can also be responsible for a blue color when it is heavily massed beneath the epidermis. This is seen in the "sacral patch" of Oriental children and also in the shaven cheek of the adult white male.

Melanoid appears to be a degradation product of melanin, resembling it somewhat but having an absorption band in the visible violet. Its effect is especially noticeable in the skin of the soles of the foot, where the stratum corneum of the epidermis is heaviest.

Transmission curves were shown of *reduced* and *oxyhemoglobin,* and their differentiating absorption bands pointed out. In the spectrophotometric curves strong evidence of oxyhemoglobin pointed to a rich arterial supply or a fast rate of blood flow, while marked evidence of reduced hemoglobin pointed to the presence of large veins or a sluggish blood supply. Arterial blood is most prominent in the skin of the palms, soles, head and neck, and over the ischial tuberosities. Venous blood predominates in the skin of the lower trunk and scrotum and on the dorsa of the feet.

Carotene was shown to influence skin color. It was proved to be located in the subcutaneous fat, as well as in the stratum corneum of the epidermis. Its distribution in the skin resembles that of arterial blood.

The *scattering* of the deeper, turbid layers of the epithelium varies according to the thickness of these layers. However, it is hard to map out the regional variations in scattering because wherever the epidermis is heavy the melanoid is likewise increased and raising of the blue end of the spectrum by scattering is offset by the absorption of melanoid. Conversely, of course, it is difficult to determine the distribution of melanoid.

Women have less evidence of melanin and blood in their skins, but show much greater evidence of carotene than do men. Carotene is particularly plentiful in the skin of the abdomen, breasts and buttocks — regions that contain but little in men.

The characteristic color of the dark subjects studied (Hindu, Japanese, mulatto and Negro) seemed to be due entirely to the amount of melanin present. They showed no differences in the amount or distribution of the other normal pigments, or evidence of any pigments not found in Whites.

BOSTON CITY HOSPITAL ALUMNI ASSOCIATION

A meeting of the Boston City Hospital Alumni Association was held in the amphitheater of the Dowling Surgical Building, Boston City Hospital, on April 23. Dr. Soma Weiss presided. Six papers were presented, all dealing with subjects related to disease of the lungs.

The first paper was presented by Dr. Maxwell Finland, on "Pneumonia with Especial Reference to Treatment." Dr. Finland traced the history of the pneumonia service of the Boston City Hospital from its original inception, through the early days of serum treatment, up to

the present time. He pointed out that the mortality rate for all the treatable types has dropped to encouragingly low levels. He discussed the increasingly complex nature of the various branches of the pneumonia service, and pointed out the pressing need at the present time for further facilities for diagnosis, treatment and investigative study.

The second paper was presented by Dr. Theodore L. Badger, entitled "The Significance of the Negative Tuberculin Reaction in Young Adults." Dr. Badger discussed the results of a study on a series of tuberculin-tested nurses at the Boston City Hospital, among whom 57 per cent were found to be tuberculin positive. In the entire group, 8 cases of pulmonary tuberculosis developed. Only 1 of these occurred in the tuberculin-positive group; the other 7 cases were in nurses who had been tuberculin-negative at the onset of their training. The ages were between eighteen and twenty-three years. Several types of onset were encountered, among which were: (1) primary type with enlarged hilar nodes and mid-lung parenchymal involvement; (2) single apical lesions; and (3) long-continued fever with small parenchymal lesions, followed by pneumonic tuberculosis in one apex. All these cases were found following the appearance of a positive tuberculin reaction. Other investigators, including Heinbeck, Amberson and Myers, have noted the greater susceptibility to tuberculosis in negative reactors.

The third paper was read by Dr. John A. Foley, who presented the case of a seventeen-year-old girl who entered the hospital complaining of multiple joint pains for five weeks. Following entry, she developed a diffuse erythematous rash, ran a constantly elevated temperature, and exhibited a generalized lymphadenopathy. Subsequently she developed effusions in both pleural cavities. A diagnosis of disseminated lupus erythematosus was considered as a possibility. Biopsy of a lymph node proved negative for tuberculosis histologically, but subsequently a guinea-pig inoculation with lymph-node material was found to be positive.

The fourth paper was presented by Dr. Francis W. Palfrey, whose subject was "Locating an Empyema." Dr. Palfrey outlined the various physical signs which may determine the location of empyema. He pointed out that a suspicion of empyema may be based on a variety of clinical symptoms, which may include a continuation of post-pneumonic fever with leukocytosis, or may only consist of apathy and anorexia. Empyema may occur over the site of previous consolidation, may have gravitated to the base of the pleural space, may be interlobar, or may be in the region of the vertebral bodies, pericardium or mediastinum. In percussion, the tactile sense with the forefinger as pleximeter is more acute than with the second finger. The signs of empyema are variable. They may in some cases be the same as the signs of the previous consolidation, with increased breath sounds and bronchophony, instead of the classic signs of fluid. Tactile fremitus, if elicitable, is a valuable differentiating sign. Interlobar empyemas may be located in back in the interscapular region, or in front along a diagonal line between the upper axilla and the lower sternum. Basal empyemas may be evidenced only by a slight upward bulge in the lower midaxilla. Mediastinal empyemas may be determined by percussion over the vertebral bodies. Inaccessible empyemas may be located under the scapula or overlying the vertebral bodies. Anterior midline empyemas may be aspirated by a puncture close to the right lower cardiac border.

The x-ray diagnosis of empyema may be extremely difficult. The dome of the diaphragm may obscure a low collection of pus posteriorly. Also, the x-ray may simply show an extensive opaque area in which empyema cannot be distinguished from underlying lung disease. The lateral view is often valuable for localization.

The fifth paper was read by Dr. Louis M. Freedman, on the subject "The Etiology of Lung Abscesses." Dr. Freedman pointed out the growing popular interest in lung abscesses following tonsillectomies, and presented the results of a study to determine the relative frequency of the various causes of lung abscesses. The investigation covered all the lung abscesses at the Boston City Hospital over a ten-year period.

The study revealed that of the abscesses occurring post-operatively, the largest number followed tonsillectomy. However, the number of tonsillectomies far exceeded all other types of operation performed, and actually the incidence of abscesses following tonsillectomy was lower than that for other operations. In this group, the ratio of incidence of abscesses to operation was 1: 1654; in children, the ratio was 1: 8852, and in adults, 1: 626. The lowest incidence occurred following local anesthesia.

It was concluded that the chief factors in the incidence of postoperative abscesses were the presence of infection in the upper or lower respiratory tract, the type of anesthesia, the prolonged retention of aspirated material, the development of atelectasis, an infective source, and limitation of pulmonary ventilation. The question of whether abscesses arise from aspiration or embolism remains unanswered, but evidence seems to favor the former as the chief cause. The location of most post-operative abscesses was found to be in the right lower lobe, near the proximal portions of the bronchial tubes. Satisfactory experimental abscesses have not been produced in animals by either mechanism.

Medical conditions leading to abscess formation far exceeded in number the postoperative abscesses. Pneumonia, influenza, chronic suppurative conditions, tumors and atelectasis from any cause were the chief conditions encountered.

It was concluded that tonsillectomy is considered to be a prominent cause of lung abscess only because it is the most frequently performed operation; it actually carries no higher an incidence of abscess.

The sixth paper was presented by Dr. John W. Strieder, on the subject "Certain Aspects of Pulmonary Surgery." Dr. Strieder briefly traced the history of thoracic surgery during the past fifty years and summarized certain of the more recent advances that have been made. In bronchiectasis, surgery is now recognized as an established form of therapy. The present mortality for lobectomy is approximately 8 per cent. In bronchiogenic carcinoma, surgery offers the only hope for recovery at present. X-ray therapy has not been definitely proved to have brought about any five-year cures in cases where a histological diagnosis has been made. The diagnosis of carcinoma is suggested by the symptoms of cough, pain and hemoptysis. The x-ray diagnosis is based on the finding of an area of atelectasis resulting from bronchial occlusion. Bronchoscopy is extremely valuable in securing tissue for microscopical diagnosis. Diagnostic pneumothorax is sometimes valuable, particularly when combined with thoracoscopy. Exploratory thoracotomy is of questionable value. Total pneumonectomy in the treatment of carcinoma was first performed by Dr. Evarts Graham, with a five-year cure. The operative mortality for this procedure, however, is still extremely high.

Progress in cardiac surgery is best represented by the recent revascularizing operations devised by Beck and by

O'Shaughnessy, which open up a promising field in the treatment of cardiac disease.

The esophagus has been termed the "last frontier of surgery." Several new operative methods of treating carcinoma of the esophagus have been devised which may eventually prove to be successful.

Dr. Strieder presented a series of lantern slides to demonstrate operative procedures for a variety of chest diseases, including carcinoma, bronchiectasis and tuberculosis. He then exhibited a case of a young man who had entered the hospital with cardiac tamponade resulting from a stab wound; he was immediately relieved by a pericardial tap and the removal of blood. No operation was found necessary, and bleeding has not recurred.

The papers were discussed by Dr. Horace Binney, who also presented a summary of progress in the operative treatment of tuberculosis at the Boston Sanatorium. Thoracoplasty has proved to be of increasing value, both in arresting the disease and in preventing new infections by the closure of cavities. Since its introduction the total mortality from tuberculosis has appreciably dropped.

GREATER BOSTON MEDICAL SOCIETY

The Greater Boston Medical Society met Tuesday evening, April 5, at the auditorium of the Beth Israel Hospital, in Boston. The speaker was Dr. Louis Nahum, assistant professor of medicine, the Yale University School of Medicine. His subject was "Comments on the Coronary Arteries from the Clinical Standpoint, with Special Reference to Prognosis." Dr. Louis M. Freedman, of Boston, presided.

The myocardium is considerably more sensitive to lack of oxygen than skeletal muscle. This fact is brought out by the observations of Katz and Long. They found that the heart will go into rigor when it has accumulated 70 mg. per cent of lactic acid. This is about one quarter of the quantity necessary to initiate rigor in skeletal muscle.

There are two mechanisms for increasing the oxygen supply to the heart muscle: (1) vasodilatation from increased cardiac activity and (2) greater vascularity of myocardial fibers. The first fact is not generally recognized. The second is borne out by the observation that each myocardial fiber is supplied by two capillaries, while each skeletal muscle fiber is supplied by only one.

The maximum blood supply which a heart can receive is about three times normal, that is, up to 700 cc. per minute. If coronary-artery disease is present there may be a great discrepancy between work and blood supply.

The heart has two venous systems. One is the gross system, including the coronary sinus and other larger veins. The other consists of the Thebesian vessels. The two systems facilitate a greater blood flow through the system.

In the arterial system there are two sets of collaterals — the extrinsic and intrinsic. The former plays a very small part normally. It is derived from the aorta and the bronchial, pericardial and internal mammary arteries. The intrinsic collaterals are of greater importance and consist of: (1) anastomoses between the right and circumflex branches of the left coronary arteries; (2) terminal anastomoses of arteries; (3) small vessels in epicardial fat which connect one part of a coronary artery with another part; and (4) Winternitz's intimal sinusoids, which may become of extraordinary significance. Perhaps these vessels carry adequate blood supply in cases of complete coronary occlusion, as in the cases of Leary and Wearn.

In studying cases with coronary-artery disease one finds a variety of clinical pictures. This is not entirely dependent on the degree of involvement, for there are cases with marked lesions and a minimum of symptoms. The reverse is likewise true. The factors responsible for the diversity of clinical pictures are: (1) the state of the collateral channels; (2) the rate of progression of the arterial disease; and (3) the appearance of an accident, that is, closure.

Dr. Nahum summarized the present ideas of Dr. Winternitz relating to the cause and progression of arteriosclerosis. With the technic of arterial clearing Dr. Winternitz showed hemorrhages in the intimas of normal arteries. This is interpreted as being due to a rupture of intimal sinusoids. The hemorrhage may be so slight as to cause no change or it may be extensive and raise the intima from a slight degree to the point of complete closure. The liberated lipoid from the hemorrhage becomes calcified.

At times the intimal hemorrhage will rupture into the lumen. The resulting raw intimal surface predisposes to the development of thrombosis. The initiation of thrombosis is not necessarily followed by complete closure of the vessel lumen. Indeed, it may take as long as two weeks for complete closure.

Predisposing factors to the development of arteriosclerosis were next considered. They are as follows: (1) sex — in Dr. Nahum's series of patients with coronary-artery disease only 25 per cent were women; (2) diabetes — almost all cases of uncontrolled diabetes for a period of five years have generalized arteriosclerosis; (3) body weight — this seems to be an important factor, for coronary-artery disease is two and a half times more common in people who are overweight than in those who are not; and (4) hypertension — nearly everyone who has had hypertension for any length of time has arteriosclerosis.

About 40 per cent of the patients with clinical coronary-artery disease are likely to develop clinical infarction following thrombosis. Thrombosis is an accident and is generally unpredictable. In an attempt to forestall thrombosis one can advise increased rest and loss of weight. Some believe this helps. Drugs seem to be rather discouraging in this respect. Activity within comfort does not seem to increase the tendency to the development of thrombosis. It would seem that overexertion can be responsible for development of this accident. Several cases were cited in which overexertion seemed to have played a positive role. If overexertion is to be blamed for an attack of coronary thrombosis, there must be exertion beyond ordinary capacity and a reasonable interval between the effort and the thrombosis.

There are several clinical factors which may be used in attempting to estimate the size of a myocardial infarct. It is usually in inverse proportion to the efficiency of the heart. Thus one would expect a small infarct if the pulse is good, the respirations not altered, and the lungs without congestion. Slight or absent fever and no appreciable fall in blood pressure are likewise good signs. The reverse, however, indicates a larger infarct and a consequent, graver prognosis.

Since the length of induced invalidism should depend on the size of the infarct it is important to be able to judge the latter. Having determined this fact one can attempt to determine the length of time needed for the infarct to heal. The smaller infarcts are probably healed in three weeks; the larger ones may take as long as three months.

Factors other than size which influence the time of healing are anemia and avitaminosis. One should attempt to correct or prevent these conditions in every case of

coronary thrombosis with myocardial infarction. It is doubtful whether any drug at one's disposal influences the healing of infarcts. The theobromine group seems to be of no help. Dr. Nahum has abandoned the use of intravenous glucose. Morphine should be used, as necessary, to abolish pain. Early recognition of the condition and prompt immobilization of the patient are two measures preventing fatalities. Rest should consist of mental and physical quiet; the diet should be reduced, for cardiac output increases with large meals.

In myocardial infarction the electrocardiogram is frequently a specific diagnostic procedure, much as the x-ray is in fractures or tuberculosis.

The discussion was carried on by Drs. Ayman, Schlesinger, Morrison, Blumgart and Riseman. It was brought out that in cases of myocardial infarction it is common to find more than one vessel occluded. Presence or absence of infarction depends more on the rate of occlusion than the size or number of vessels occluded. A factor which tends to initiate coronary thrombosis is lowered blood pressure. Examples are cases occurring during spinal anesthesia and following severe hemorrhage from peptic ulcer.

In closing the discussion Dr. Nahum brought out the fact that survival depends on the size of the infarct rather than the age of the patient. Development of collateral circulation depends not on age but on the presence of arteriosclerosis. The ultimate outcome depends on which of these factors develops faster.

NOTICES

MEDICAL LIBRARY ASSOCIATION

The fortieth annual meeting of the Medical Library Association will be held at the Hotel Somerset, Boston, June 28 to 30. Sessions will be held at the Boston Medical Library and Harvard Medical School, with open house in the libraries of the city.

The speakers will be Dr. Henry R. Viets, of Boston, Dr. Sanford V. Larkey, of Baltimore, Dr. John F. Fulton, of New Haven, Connecticut, and Mrs. Eileen R. Cunningham, Miss Isabelle T. Anderson, Mr. James F. Ballard and Mr. Herman H. Henkle.

Symposiums on a "Guide to Medical Literature" and "Medical Literature of the Past" will also be featured.

CAMBRIDGE HOSPITAL

The regular clinicopathological meeting of the staff of the Cambridge Hospital will be held at the hospital, 330 Mt. Auburn Street, Cambridge, Tuesday, June 21, at 8 p. m.

All members of the medical profession are cordially invited to attend.

JOSEPH M. WADDEN, M.D., *Secretary.*

CARNEY HOSPITAL

The monthly clinical meeting and luncheon of the Carney Hospital will be held in the Andrew Carney Assembly Room on Monday morning, June 20, at 11:30.

There will be medical, surgical, gynecological, obstetrical and urological case reports.

Physicians and medical students are cordially invited.

R. J. HEFFERNAN, M.D., *Secretary.*

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING MONDAY, JUNE 20

TUESDAY, JUNE 21

*10 a. m. - 12:30 p. m. Tumor clinic. Boston Dispensary.

12 m. South End Medical Club. Headquarters of the Boston Tuberculosis Association, 554 Columbus Avenue, Boston.

WEDNESDAY, JUNE 22

*8:15 p. m. New England Heart Association. Ether Dome of the Massachusetts General Hospital.

FRIDAY, JUNE 23

*10 a. m. - 12:30 p. m. Tumor clinic. Boston Dispensary.

SATURDAY, JUNE 24

*10 a. m. - 12 m. Staff rounds at the Peter Bent Brigham Hospital. Conducted by Dr. Henry A. Christian.

*Open to the medical profession.

JUNE 20 — Carney Hospital. Notice above.

JUNE 20-24 — Canadian Medical Association. Page 902, issue of May 26.

JUNE 21 — South End Medical Club. Page 988, issue of June 9.

JUNE 21 — Cambridge Hospital. Notice above.

JUNE 21 — Lawrence Cancer Clinic. Page 988, issue of June 9.

JUNE 22 — New England Heart Association. Page 988, issue of June 9.

JUNE 23 — Pentucket Association of Physicians. Duck-In, Merrimac, 8:30 p. m.

JUNE 28-30 — Medical Library Association. Notice above.

SEPTEMBER 12-14 — American Association for the Study of Goiter. Page 545, issue of March 24.

SEPTEMBER 12-15 — American Congress of Physical Therapy. Page 946, issue of June 2.

OCTOBER 8 and NOVEMBER 15 — American Board of Ophthalmology. Page 282, issue of February 10.

OCTOBER 17-21 — Clinical Congress of the American College of Surgeons, New York City.

OCTOBER 24-26 — Academy of Physical Medicine, Scientific Session. Washington, D. C.

DISTRICT MEDICAL SOCIETIES

HAMPDEN

Meeting will be held on the fourth Tuesday in July.

PLYMOUTH

Meeting will be held at 11 a. m. on July 21.

BOOK REVIEWS

Handbook on Social Hygiene. Edited by W. Bayard Long and Jacob A. Goldberg. 422 pp. Philadelphia: Lea & Febiger, 1938. $4.00.

This handbook is a very complete, well-planned and well-written contribution concerning some of the problems of social hygiene. The first half takes up in some detail the treatment of syphilis and gonorrhea. The treatment of syphilis is considered under various headings, such as syphilis of the nervous system, and prenatal and congenital syphilis. There are chapters on gonorrhea in the male, gonorrhea in the female, and vaginitis. One chapter is devoted to laboratory aspects of these diseases.

The second half of the book is concerned with the social aspects of gonorrhea and syphilis. There is an excellent chapter by Dr. Munger on hospitals and outpatient clinics. In this chapter, the contributor condemns the policy followed by many hospitals of refusing to admit patients with these diseases.

The public-health point of view is presented by Dr. Clarke, who makes the statement that all cases with infectious syphilis should be hospitalized until they become non-infectious.

An interesting chapter is one by Dr. Goldberg on statistics relating to syphilis and gonorrhea. Other chapters deal with social service, the responsibility of nursing schools, the public health nurse and syphilis control, and the prob-

lems of syphilis and gonorrhea in family welfare agencies. The ideals of the social hygiene societies are well stated in a chapter by Dr. Bigelow, and another chapter gives the legal aspects of the venereal diseases, including a section on marriage laws.

From the preceding outline, it will be seen that the subject is covered from many angles — medical, social and legal. The handbook is a valuable book for reference and will serve well as a textbook for students.

Scientific Contributions in Honor of Joseph Hersey Pratt on His Sixty-Fifth Birthday. Anniversary Volume. By his friends. 983 pp. Lancaster: Lancaster Press, Inc., 1937. $7.00.

Those of us who admire Dr. Joseph H. Pratt will like this book, and if it is true that a man can be judged by his friends, even the most critical will agree that Dr. Pratt has achieved much honor in the medical profession, for his friends, as the book testifies, are scattered so eminently all over the world.

The most outstanding feature of the volume is its list of contributors. This consists of a group of one hundred twelve writers beginning with Joseph C. Aub and jogging on comfortably through the alphabet to Robert W. Wilkins. Almost every name well known to modern medicine appears; and, of course, old friends of Dr. Pratt's like Richard Cabot, Henry Christian, Frank Fulton, Louis Hamman, Elliott Joslin, Samuel Lambert, Warfield Longcope, David Riesman and Walter Steiner — to mention a few — have written articles for it.

All the pages that make up the book are friendly, well printed and happily edited. The topics discussed cover almost every phase of medical thought from "The Minneapolis Giant" to "The Effect of Vitamin C on the Culture of H37 Tubercle Bacillus" or from "Metabolic Studies in a Man Who Lived for Years on a Minimum Protein Diet" to "Marcus Whitman and Narcissa Prentiss — A Study of Romance, Adventure, Achievement and Tragedy." The charm of it all lies in the delightful manner in which so many of Dr. Pratt's friends have written something in honor of his sixty-fifth birthday, not because they were asked to but for the joy of paying him a nice compliment.

Thus the book is unusually attractive. It colors and adds background to Dr. Pratt's photograph which appears as a frontispiece, to the list of his own published works, to the short biographical sketch of him that opens the book, and to the description of the New England Medical Center that ends it. No better characterization of a man's knack at making and holding friends could be devised than this volume. A doctor so gifted in the art of friendship must indeed be a great physician. It is pleasant to have on record such a significant portrait.

An Introduction to Dermatology. Richard L. Sutton and Richard L. Sutton, Jr. 666 pp. Third edition. St. Louis: The C. V. Mosby Company, 1937. $5.00.

The third edition of the "small" Sutton has been improved considerably. Much new material and numerous new illustrations have been added. A number of skin conditions to which new names have been attached are covered in this third edition. Syphilis has been given more consideration with the work of the Co-operative Clinic Group included, and more attention paid to treatment. Treatment in general has been amplified. The arrangement of the book has been improved by the attempts to follow more closely a classification on etiology. On the whole the book provides, in a relatively small space, abundant information about cutaneous disease for the student and general practitioner. The illustrations are excellent, with a few exceptions, and clearly show conditions which much description would fail to describe satisfactorily to the reader.

The Endocrines in Obstetrics and Gynecology. Raphael Kurzrok. 488 pp. Baltimore: The Williams & Wilkins Company, 1937. $7.50.

In less than 500 shiny pages printed in large easily readable type, Kurzrok has successfully attempted to present the current theories and facts, as well as some of the fancies, of the endocrines in their relation to general medicine. Just enough of the historical and anatomical background is given to afford a take-off.

The prodigious mass of literature on experimental biology of the sex-endocrines is expertly sifted and only that pertinent to rational diagnosis and organotherapy included. Into chemistry, however, the author takes the clinical reader way over his head where he finds himself among intricate benzene rings which even with many double bonds do not serve as lifesavers. Yet the passages must not and need not be avoided, for floating through them are the *ones, iols* and *ins,* as well as the *APLH's,* the *FSH's* and the *LH's,* that are the logs out of which the reader is enabled with surprisingly little effort to build a resounding raft which may save his therapeutic life.

The ill-understood but well-recognized influence of the thyroid and the adrenal glands on reproductive processes receives moderate and conservative attention, as do also some of the current notions about the pancreas, the thymus and the parathyroid glands. Menstruation, in order and disorder, and ovulation, too, are considered in such detail that any experienced reader may find much with which to disagree. On this, as on other subjects, and especially on chemistry, the author freely (and properly so) presents his own theories and a great deal of his own original work, with which there is not complete agreement from other workers in the field. This need cause no confusion, however, for the text abounds in tact and modesty, and when no one knows the answer to a problem, intelligent and informal discussion is the best substitute for the missing solution. This very instructive book will answer, at least temporarily, the prayer of the clinician distressed by the rapid growth of sex-endocrinology and the insistent demand for organotherapy.

Psychiatric Nursing. William S. Sadler, in collaboration with Lena K. Sadler and Anna B. Kellogg. 433 pp. St. Louis: The C. V. Mosby Company, 1937. $2.75.

This book has much valuable information in it. It attempts to cover too much ground, however. The author inadequately presents historical developments in psychiatry, a bit of neuroanatomy, an inadequate picture of mental disease including some references to the etiology, prognosis, and treatment, a bit of occupational therapy, and mentions helio- and hydrotherapy with pictures of their application.

The author would have done better to have confined himself to subjects more germane to psychiatric nursing. Trying to carry water on so many shoulders at once has resulted in unnecessary spilling. Had the author confined himself to the technics essential for a well-trained nurse to add to her armamentarium to qualify as a psychiatric nurse for mental cases, the book would have been more readable and valuable.